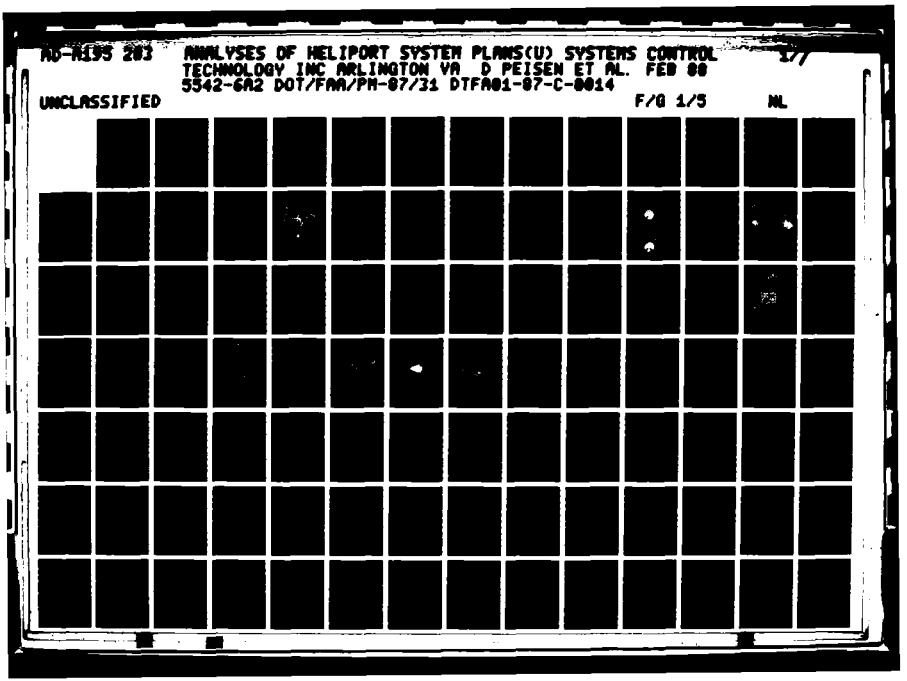
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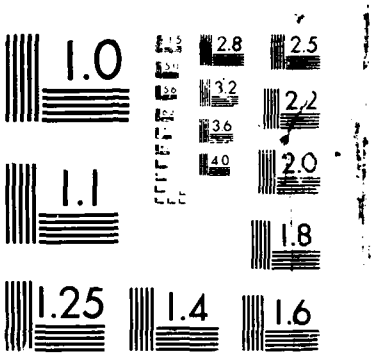

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Analyses Of Heliport System Plans

Program Engineering Service
Washington, D.C. 20591

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16. Abstract

State and city governments generally realize that continued vitality depends on a steady expansion of industry and services as a function of planned growth. The helicopter is a proven catalyst for enhancement of those desired growth patterns. However, without the necessary support infrastructure, this positive contribution of the helicopter cannot be realized. Determining the need for such a support system can be achieved through an understanding of local helicopter activities and the metropolitan or state-wide socio-economic dynamics in which they occur. This allows for data base development, including a fleet inventory, and analysis to provide a foundation for determining current, and forecasting future, helicopter activity and support facility requirements.

The purpose of this study is to analyze the strengths and weaknesses of various existing heliport system plans. Planning concepts are identified and defined to include: 1) baseline parameters for evaluating the plans, 2) identifying data and their sources needed for planning purposes at any jurisdictional level, and 3) developing criteria for assessing the feasibility and economic viability of proposed heliport facilities.

The study covers four state heliport system plans (Michigan, New Jersey, Louisiana, and Ohio) and four metropolitan heliport plans (Pittsburgh, PA; Phoenix, AZ; Houston, TX; and Washington, D.C.).

This is the first document in a series of three intended to encourage and assist planners in heliport system plan development. The other documents are:

Four Urban Heliport Case Studies, DOT/FAA/PM-87/32, DOT/FAA/PP-88/2
Heliport System Planning Guidelines, DOT/FAA/PM-87/33, DOT/FAA/PP-88/3

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1.0 INTRODUCTION

1.1 BACKGROUND

An interesting and apt analogy may be drawn between the helicopter of today and the airplane of the late 1930's. By the eve of World War II, airplane technology had evolved into a form that has remained fundamentally unchanged ever since. Greater speed, reliability, safety, economy and range are refinements of the basic concept that was confidently predicted then and, happily, realized now. Similarly, it is unlikely that the basic form of the (pure) helicopter, as we now know it, will be significantly different in the future. And it, like its older cousin the airplane, will grow faster, stronger, safer, quieter and more efficient.

The analogy falls apart, however, when the supporting infrastructure of each mode of transport is considered. The obvious potential societal and economic benefits connected with airplane travel, not to mention the romance and sense of adventure, fired the public imagination and enthusiasm for airport planning and development. The Federal Government responded with an airport building program that dotted the countryside and the (then) outskirts of major cities with airports that, by and large, are still in use today, albeit much larger. They owe their existence to an aggressive and far-sighted planning effort that was able to take advantage of favorable sites at a time when they were still available and thereby maximize that potential offered by the airplane.

Unfortunately, the exciting and romantic nature of the helicopter is not as apparent now to a public that has developed a rather sophisticated attitude toward "high technology" as a result of consistent exposure to it. Also, how - as well as why - helicopters fly over the community is still something of a mystery to most. This lack of public understanding, and consequent lack of public acceptance, of the helicopter has prevented its full integration into the overall urban transportation system.

This lack of understanding has created frustration on the part of helicopter owners and operators trying to use them, city government officials trying to deal with them, urban planners trying to make provisions for them, and the public itself, whose patience is tried by the whole situation. Thus, the result is an inadequate number, and in many cases the complete nonexistence, of helicopter landing facilities open to the public and high congestion at those heliports that are available.

The helicopter is unexcelled for short and medium haul transport. It is a time saving tool that has proven itself in many governmental and industrial applications, in fact in some cases it is the only tool that can do the job. It is ironic that many communities are unable to take full advantage of the benefits and opportunities that come with having helicopters (and the types of businesses that use them) in their midst because they lack the relatively modest facilities necessary to support

them. The same operational factors that make helicopters so useful in police, fire and medical emergencies also apply to businesses that need to move critical personnel or cargo quickly regardless of congested streets and other bottlenecks.

Most cities realize that their future vitality depends on a steady expansion of industry and services as a function of planned growth. The helicopter is a proven catalyst in accelerating and enhancing those desired growth patterns. However, the positive contribution of the helicopter cannot be realized without the necessary support infrastructure. The current need is for a sufficient number of suitably located and appropriately sized and equipped heliports.

Determining the extent of that need can only be achieved through the analysis of the local helicopter industry and the socio-economic dynamics of the metropolitan area or region in question. Such an analysis yields region-specific helicopter data about the number of based and active aircraft, their uses and operational patterns, and provides the foundation for forecasting activity and facility requirements in 5 to 20 year planning horizons.

Individual system plans for the purpose of identifying a need for heliports have previously been undertaken at various governmental levels, including, local, regional and state jurisdictions. These initial efforts have been instrumental in laying the groundwork for both heliport development in specific areas and for a greater awareness by key government planning personnel of the value and benefits of urban helicopter use, and the consequent need for heliports.

To further the understanding of the contribution of helicopters to transportation systems, system plans will need to be expanded and to incorporate new developments. Current systems and master plans should integrate rotorcraft more fully with fixed-wing air transportation and, at the same time, recognize the helicopter as an competitor to the ground transportation system, i.e., the train, the taxi, the ambulance, etc. Guidelines for addressing helicopter/heliport facility planning must be developed so that heliport system plans can be produced independently, as the focus of the transportation infrastructure, rather than auxiliary to it. Recommendations for analyzing the impact of helicopters in the National Airspace System under both visual and instrument flight rules must also be included in comprehensive analyses to insure safety.

These early heliport planning documents were the first of a new genre of aviation study. The planners who did them were breaking new ground, with no established format or guidelines except for their airport planning experience. The planners learned that except for the coincidence of flight, helicopters are not like airplanes for many reasons. They also learned that there is little of data on the number, location and activity of helicopters, unlike the vast number of resources for airplanes, and that traditional socio-economic indicators associated with aviation forecasts did not apply to helicopter activity. However, it must be stressed that overall the results are very positive. The planners developed planning structures that were effective for analyzing

the need for heliports in the location under study. But there is room for improvement, mainly through standardization, by way of FAA guidelines for heliport planning just as there are for airport planning. Standardization will allow comparison between plans from different areas and will increase the effectiveness of individual plans because guidelines will be provided for data collection and analysis.

The Federal Aviation Administration (FAA) is very involved with the development and promotion of heliports. The FAA supports local communities who wish to develop heliports through the Airport Improvement Program (AIP). The AIP provides a means of funding the planning and construction of public use heliports, if the heliport is included in the National Plan for Integrated Airport Systems (NPIAS). The NPIAS is a published document created through the Airport and Airway Improvement Act of 1982, listing the composition of the national system of airports. Its purpose is to provide ground facilities necessary to assure the safe, rapid, and efficient transportation of passengers and goods by aircraft based on the needs of all segments of civil aviation.

A heliport can be listed in the NPIAS if it has the potential to alleviate transportation problems in major metropolitan areas. This need can be demonstrated if the heliport is expected to provide direct short haul transportation to airports, transportation between cities, and transportation from the downtown to suburban locations. To qualify for the NPIAS, heliports need to have four based aircraft, or 800 annual itinerant operations, or 400 annual operations by air taxi rotorcraft. It is preferred that the heliport in question be also included in a state or regional system plan.

In 1983 the FAA started their National Prototype Heliport Program to establish downtown heliports in major metropolitan areas as examples of the value of public use heliports to the community. The first to be completed was the Indianapolis Downtown Heliport, a full service heliport that now has over 12,000 operations annually. The New York Downtown Heliport (Wall Street) opened in 1987, has also been a tremendous success. It is estimated that there will be over 35,000 operations at the New York Downtown Heliport in 1988.

Furthermore, unlike airports, there is little data on heliport operations. The FAA relies heavily on state and city heliport system plans and the insight they contain in determining the allotment of funding grants. Without these system plans and the local sponsorship, the FAA can do little to promote public use heliports in specific locations.

In light of all of the above, it becomes obvious that the development of standardized planning guidelines and improved methodologies, by which heliport need can be realistically determined, are needed.

1.2 PURPOSE

The primary purpose of this report is to analyze the strengths and weaknesses of existing heliport system plans. To support this purpose, planning concepts for data collection will be outlined. Specifically, these elements will be used to:

- Provide baseline parameters for the evaluation of existing heliport system plans.

- Assist planners in identifying what data are needed for undertaking heliport system plans on any jurisdictional level.

- Provide critical planning parameters for assessment of the feasibility and economic viability of potential heliport facilities.

This is the first in a series of three reports that are being developed to enhance the accuracy, reliability, and usefulness of heliport planning. As previously stated, this report evaluates the strengths and weaknesses of eight existing heliport system plans (four state and four metropolitan plans). The next report, "Four Urban Heliport Case Studies" (DOT/FAA/PM-87/32), (DOT/FAA/PP-88/2), is a case history of four heliports developed to identify specific reasons why urban heliports succeed or fail. The third and last report in this series, "Heliport System Planning Guidelines" (DOT/FAA/PM-87/33), (DOT/FAA/PP-88/3), is a revision of a previous draft report on heliport planning guidelines. Standardized guidelines specifying particular data and analytical requirements for system planning will increase the effectiveness in determining the demand for, and viability of, public use heliports, and allow for comparability of the plans in real terms for long range planning goals.

1.3 PLAN ORGANIZATION AND TASKS

To accomplish its purpose, this report has been divided into four main task areas:

1) Define Planning Concepts: In the first task, a minimum set of planning concepts for the evaluation of the data collection and of the analytical elements are established to define baseline parameters. These are considered essential for critical analysis of heliport need and feasibility determination in metropolitan areas. These parameters include, but are not limited to, helicopter fleet size and industry characteristics (such as radius of operations, operating costs, and mission types) and socio-economic/demographic data (including income distribution, industrial-business characteristics, growth, and population). Additional required information includes the operational elements including origins and destinations, and the existing transportation network. Furthermore, as a result of this effort, a rating scheme has been developed to enable the evaluation of the strengths and weaknesses of eight existing heliport system plans. Four state plans and four city plans will be evaluated.

2) Evaluate Four State Heliport System Plans: The baseline planning data concepts serve as a "yardstick" against which each of four existing state system plans is measured, compared, analyzed and evaluated. Qualitative content of the format, text and organization are evaluated in detail. The completeness of inventory elements, the choice of data sources, the selection of

data to be analyzed, as well as the accuracy of the results and conclusions form the basis of the analysis.

Quantitative evaluation, on the other hand, is based on the forecasting techniques and methodologies used, and the depth to which details are analyzed.

There are currently three state system plans completed or in final draft form: Louisiana, New Jersey, and Michigan. These three plans are developed as independent projects and are not part of a broader aviation plan. The fourth state plan analyzed is from Ohio. Although undertaken as part of the Ohio State Aviation System Plan, it was completed as a detailed separate section of the overall plan and could stand alone as a state system plan and is treated as such for the purposes of this report.

3) Evaluate Four City Heliport System Plans: City heliport system plans are evaluated in this task area along the same lines as the state plans, however, more attention is paid to site selection and environmental considerations as well as local government's role in the planning process.

The four metropolitan heliport system plans that are included in these analyses are Pittsburgh, Pennsylvania; Phoenix, Arizona; Houston, Texas; and Washington, D.C.

4) Evaluate Data Sources: A system plan needs accurate and complete data to yield satisfactory results. Data sources used to compile the heliport system plans considered in this report are evaluated for their reliability, accuracy, applicability, currency, and overall value as a resource. To facilitate discussion the data sources have been organized into seven broad categories. These are:

- o Federal Guidelines/Regulations
- o Helicopter Operational Characteristics Data
- o Directories
- o Transportation Theory
- o Forecasts and Statistics
- o Socio-Economic Data
- o State and Local Aviation Data

An extremely important source of data are the surveys conducted by planners on the jurisdictional level of each particular plan. National or regional data for inventory items such as numbers and location of based helicopters, helicopter operations and other significant statistics are generally unavailable. Therefore much of this type of information must be retrieved by survey from the helicopter owners and operators that fall under the purview of the project. The operators, by virtue of their local orientation, know what the issues, problems and requirements are since they deal with them on a day-to-day basis.

Surveys are also of tremendous value in calculating forecasts and identifying local helicopter uses. Furthermore, surveys are vital for determining preferred heliport sites and potential demand.

The next section presents the guidelines and key planning concepts for the evaluation of the heliport system plans.

2.0 PLANNING CONCEPTS

2.1 PURPOSE

This section has two purposes: First, to present standardized planning concepts, i.e., those elements of a heliport system plan that are necessary for essential data collection to insure accurate demand analysis of heliports in a specific geographic region. Incorporated into this section are samples of some ways planners have presented their research and analytical material as a means of better illustrating the planning concepts.

Second, this section develops a ranking scheme that incorporates those planning concepts for baseline comparative data in the evaluation of some existing heliport system plans. These plans are ranked with regard to format, data items, forecast methodologies, conclusions and value in identifying the need for, and siting of, metropolitan heliports.

An important point to be considered during the organizational phase of a heliport system plan is that to maximize its effectiveness the system plan should be considered to be a flexible planning tool and not as a one time effort. The plan's framework should be such that it can be updated, not only as the situation and requirements change, but on a regular basis. This is particularly necessary in areas where demand for heliports is especially heavy or where urban helicopter transportation is increasing. A completed plan should be considered as a data base to gauge the growth or decline of demand for urban heliports for efficient urban transportation planning and must be an ongoing effort.

2.2 STANDARD PLANNING CONCEPTS

As the helicopter becomes a more prevalent part of the urban environment, governmental agencies on all levels are becoming increasingly aware of the need to integrate helicopter landing facilities into the urban transportation infrastructure. These agencies require defined guidelines for measuring the extent of the heliport demand. Once the demand is identified these agencies need planning tools to help them determine the appropriate locations for the heliports. This tool is the heliport system plan, either as a "stand alone" document or as a part, chapter or section of a comprehensive aviation system plan. However, to insure accuracy and reliability, heliport system plans need a standardized format for the data collection and for the quantitative analytical elements. This format can be tailored to suit the specific scope of the project in order to accurately address the geographical location, governmental jurisdiction, and the socio-economic and industrial structures involved. However, certain basic data collection and quantitative elements need to be standardized.

The required planning concepts have been divided into a topical outline with nine major sections representing a logical sequence for collecting, organizing, and interpreting data. These are:

- Requirements
- Regulatory Review
- Inventory
- Airspace
- Description of Existing System
- Environment
- Forecast
- Recommended System Plan
- Heliport Planning Criteria (including Implementation)

This basic system plan structure can be applied to any level of geographic investigation by adjusting the degree of detail in each section as appropriate. However, although the degree of investigation may vary, specific data collection items should be the same to ensure equitable comparison of the plans for evaluating the priority of development in diverse geographic locations. Section 2.1.1. discusses each of these concepts individually.

2.2.1 Required Planning Concepts

This section discusses the purpose of each of the required planning concepts in detail as it relates to the critical analysis of urban heliport need and feasibility. A table showing the key topics of each section is presented with each discussion.

Introduction

The introduction of a heliport system plan (Table 2.1) should clearly define the geographic limits of the plan. This area generally coincides with the governmental jurisdiction of the sponsoring agency. However, since helicopters are a form of transportation and therefore interact with adjacent areas, this area should not be regarded as an isolated

Table 2.1 PLANNING CONCEPTS FOR THE INTRODUCTION

Introduction

A. Planning Region
   1. Specific Geographical Boundaries
   2. Market Area
B. Purpose
C. Goals and Objectives
D. Brief History/Development of Helicopter Technology and Operations
   1. Importance to Demand
   2. Standard Categories of Operations
E. Capability of Helicopter as Transportation Mode
   1. Intermodal Relationships
   2. Alternative to Ground Transport

entity. Often, a "market or service area" extends beyond the defined boundaries of the plan and is a source of transient helicopter operations that can have a significant impact on the planning area. Reasons for defining the market area should be specific. A sample of a defined market area is found in Figure 1. The planners, in this case, determined the market area by the average length of a helicopter trip. Limits on the market area should be reasonable, that is, infrequent trips from very long distances need not be included as part of the data base. The planner should consider the specific characteristics of the area under study in defining the market area. Once identified, these limits should be well defined so that all pertinent inventory data regarding helicopter operational characteristics that would affect demand in the area can be identified and collected.

The introduction should state the purpose of the plan, what aspects or impacts of helicopter usage are pertinent, the depth of the analysis, and what is to be achieved. For example, is the plan intended to investigate and improve existing helicopter systems within the planning region, or is the purpose to identify a specific site, or sites, for new public use heliports?

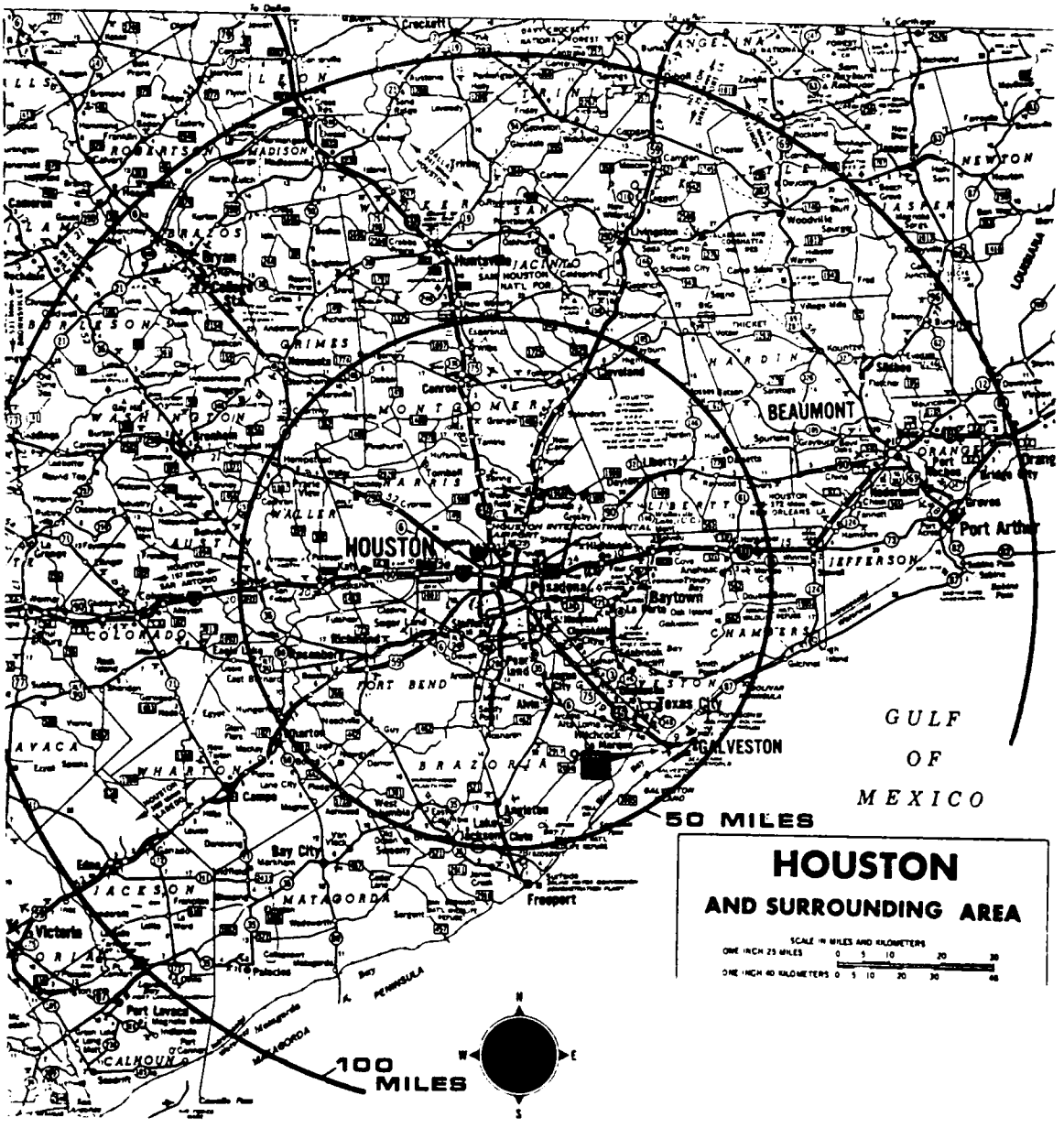
The plan goals and objectives also need to be specified. They serve as a framework for the plan by enumerating the components of the previously stated purpose. They define and direct the planning effort by identifying the individual requirements, and the steps necessary to satisfy these requirements to accomplish the purpose.

Understanding the historical perspective of the helicopter is essential to understanding the increasing demand for heliports in the urban environment. This is especially helpful for those unfamiliar with helicopter usage and capabilities.

It is also important to understand urban transportation. The prime motivating force behind transportation innovations and investment has always been to decrease travel time. Transportation is a service. Different modes of transportation exist at any one time. Each interacts with the other to satisfy different roles. Traditionally, when one mode of transportation no longer provides good service, a new form, usually based on a higher level of technology, has replaced it.

The helicopter is a transportation mode that is providing more efficient service for a growing segment of commercial transportation needs due to the severe congestion created by the automobile. It is important to see the helicopter in perspective, as one element in the urban transportation network, rather than as an intrusive or unrelated element.

Additionally, because of this lack of understanding of the helicopter's true role, there has been a tendency on the part of many planners to regard helicopters as a transport mode competitive only with airplanes, since they both fly through the air in the performance of their respective missions. Helicopters are in fact an alternative to



Source: Metropolitan Heliport System Plan, City of Houston, Hoyle, Tanner & Associates, 1984.

Figure 1 Heliport System Plan Market Area

short haul and medium haul ground transport such as cars, trains, buses, etc. A general discussion of the operational capabilities of the helicopter, and a discussion of the appropriate competing transportation modes promotes the development of system dynamics and integration, as well as an understanding of the demand for heliports.

Planners also need to regard ground transportation modes not only as competing, but as complementary to heliports. Therefore, planning coordination of ground transportation to the heliport is vital for an efficient urban transportation network.

Inventory

The inventory (Table 2.2) is one of the most important parts of a heliport system plan. These data are the basis of all subsequent analyses of the plan. If the inventory is inaccurate or incomplete, then the conclusions and recommendations will be faulty. However, it is also a fact that this type of data is the most difficult to collect and to authenticate. Few, if any, records have been kept on the numbers of helicopter operations, enplaned passengers or the other operational statistics as have been recorded for corresponding fixed-wing activity. Although this situation is improving, the very flexible nature of the helicopter and the frequency of operations away from fixed data collection points, such as airports, make it unlikely that there will ever be comprehensive external sources of information. Therefore, most operational data must be collected directly from "the horse's mouth" so to speak - by surveys of the planning area's helicopter and heliport owners and operators. To provide consistency and a basis for comparison, methodologies and data sources to be used for the inventory should be standardized. This includes the survey format and its applications. Useful information sources outside the aviation community that are nevertheless applicable should be identified as well, such as local demographic forecasts or regional planning documents.

It is necessary to make a distinction between "based" and "active" helicopters. Helicopters registered within a particular region are often considered "based" helicopters which infers that these are the aircraft vital to the system plan. Careful attention must be paid in identifying those aircraft that actually create demand in the planning area. Distinction should be made between those aircraft defined as based and those helicopters merely registered in the planning area. Helicopters are often registered in one area but operated in another as a result of economic or operational requirements. Conversely, an attempt should be made to identify helicopters active in the planning area, yet registered elsewhere. It is important, therefore, that the system plan have provisions to distinguish between those helicopters that are currently operational, or "active", and those that are merely registered. It is the active helicopters that represent actual operational impact and indicate real demand in the region under study. An important, and often the only source for determining the active helicopters is the survey.

TABLE 2.2 PLANNING CONCEPTS FOR THE INVENTORY

Inventory

A. Data Sources
    1. General
    2. Region Specific
    3. Non-aviation
B. Survey Design
C. Based Helicopters/Active Helicopters
    1. Registered/From Survey, etc.
    2. Helicopter Type (standardized categories)
    3. Location
    4. IFR Capabilities
    5. Military
D. Helicopter Activity (specific and/or market area)
    1. Number of Operations
        a. Total
        b. Primary Use
        c. Helicopter Type/Category
    2. Number of Hours Flown
        a. Total
        b. Primary Use
        c. Helicopter Type/Category
    3. Percent of IFR Operations
    4. Percent of Night Operations
    5. Number of Passengers
    6. Cargo/Amount and Type
    7. Origins and Destinations
    8. Average Waiting Time or Delay
E. Existing Heliport Facilities
    1. Categories
        a. Private or Restricted Use
        b. Public Use
        c. On Airport
    2. Locations
    3. Services Available
        a. Fuel (available grades)
        b. Parking and Tie-Downs
        c. Hangar Storage
        d. Lights
            1) Types
            2) Configuration
            3) Control
        e. NAVAIDS
        f. Communications
        g. Surveillance Facilities
        h. Weather Services and Facilities (including AWOS)
        i. IFR Capabilities
            1) Special VFR
            2) Non-precision Approach Procedures
            3) Precision Approach Procedures
        j. Terminal Building

TABLE 2.2 PLANNING CONCEPTS FOR THE INVENTORY (CONTINUED)

- 1) Passenger Waiting Area
- 2) Baggage Handling Facilities
- 3) Ticket Counters
- 4) Pilots Lounge
- 5) Flight Planning Facilities

k. Maintenance

l. Connecting Transportation
- 1) Auto Parking
- 2) Rental Cars
- 3) Taxi Stand
- 4) Scheduled Flights (at airports)

m. Touchdown Pad
- 1) Size
- 2) Number
- 3) Surface Composition

n. Number of Operations
- 1) Month/Peak Month/Annual
- 2) Night
- 3) IFR

o. Passengers Enplaned

p. Cargo Amount/Type

F. Other Aviation Plans
1. National (i.e., NPIAS, etc.)
2. Statewide
3. Local

G. Socio-economic Information (non-aviation related data)
1. Population Characteristics
   a. Employment Strata and Ratios
   b. Per Capita Income
   c. Growth Trends
   d. Distribution
2. Land Use and Distribution (local)
   a. Industrial (light and heavy)
   b. Urban
   c. Residential
   d. Agricultural
   e. Rural

Another important consideration in the aircraft inventory is helicopter type. This is important for heliport design considerations. Unfortunately, at the present time there is no standard helicopter classification. Consequently planners have developed their own systems. These systems are good but vary from one plan to the next. Figure 2 presents a fleet mix of a particular area using helicopter classifications developed by the planners. A complete list of operational characteristics and required statistical information necessary for a comprehensive inventory is shown in Table 2.2.

The determination of helicopter use aids in the identification of operational requirements for heliport facilities within the planning region. Certain uses, such as executive transport, create a higher

Helicopter Classification	Total Number	%
Light (single engine, 6,000 lbs MGTOW and less)	241	73%
Intermediate (single and twin, 6,001 lbs-15,000 lbs MGTOW)	86	26%
Medium (15,001-30,000 lbs. MGTOW)	3	1%
Heavy (greater than 30,000 lbs. MGTOW)	0	0
Total	330	100%

Source: Metropolitan Heliport System Plan, City of Houston, Hoyle, Tanner & Associates, 1984.

Figure 2 Table of the Houston Helicopter Fleet Mix

demand for public use heliports than do high-rise construction work or aero-medical transport. Local military helicopter operations should be included in the overview, insofar as their use affects the existing infrastructure. Each individual area may have a particular dominant helicopter use that must be considered in future planning analyses and it is emphasized the each area will be different. Figure 3 shows the significance that one helicopter use can have in a planning area. These numbers were determined by the plan's operator survey.

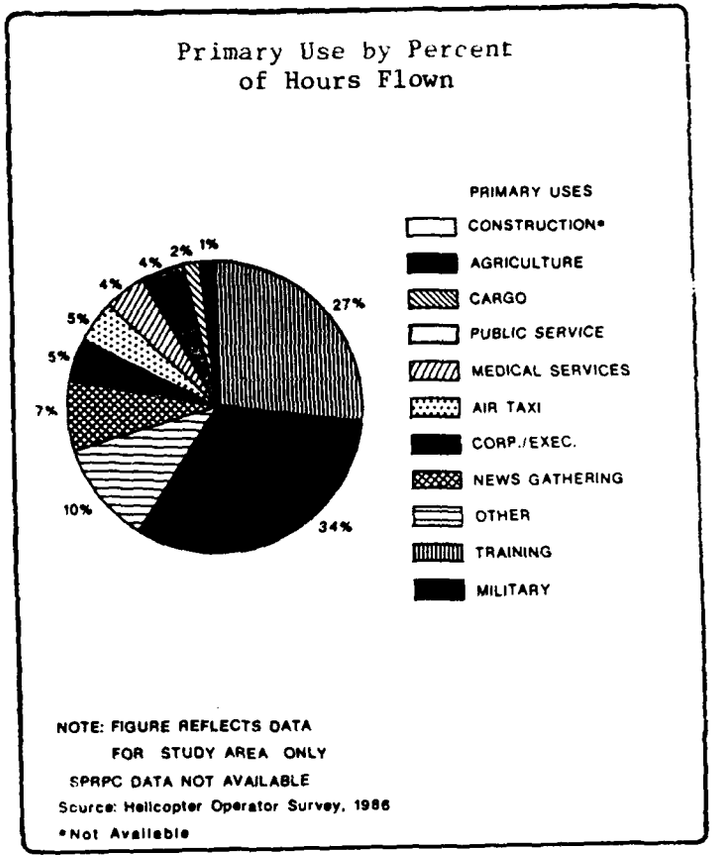
The system plan should accurately identify helicopter use by number of operations and hours flown. Both measurements are important for an accurate statistical evaluation of demand. Some uses will record a higher number of operations (take-offs and landings) than others, but each trip will be of relatively short duration. Agricultural operations,

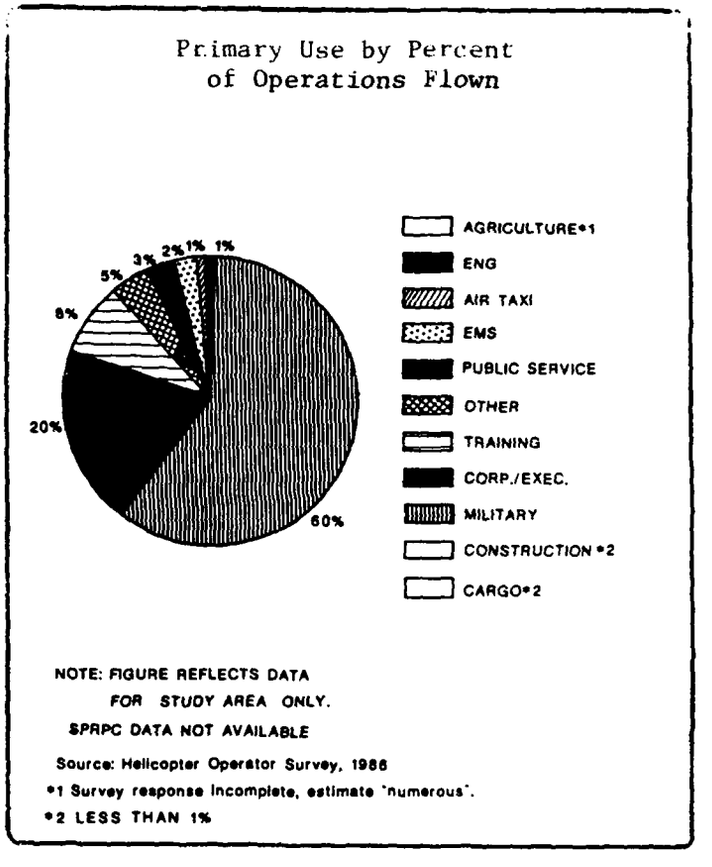
Primary Use	Number of Helicopters [1]	Percentage of Flight Time [2]
a) offshore	243	77
b) corporate/executive/air taxi	57	15
c) external load	1	--
d) photo/survey/observation/sightseeing	5	2
e) scheduled commuter	3	1
f) training	4	1
g) law enforcement	1	--
h) pipeline patrol	3	1
i) personnel transport	2	1
j) package pick up	1	--
k) search & rescue	1	--
l) industrial & construction support	1	--
m) traffic report	2	1
n) emergency medical service	4	1
o) agricultural spraying	1	--
p) livestock herding	1	--
	330	100%

Source: Metropolitan Heliport System Plan, City of Houston, Hoyle, Tanner & Associates, 1984.

Figure 3 Table of Helicopter Use in Houston

for example, require many takeoffs and landings compared to the length of overall operational time. Other uses, such as executive transport, have a comparatively long trip time, or stage length, with respect to the number of operations. Uses with high numbers of operations will appear to have more statistical importance than is actually the case if the number of hours flown are not also considered. An example of how these numbers can vary significantly is shown in Figure 4. Numbers of hours flown for each use need to be compared to the number of operations in order to develop an accurate analysis of demand.





Source: Pennsylvania Heliport System Plan, Hoyle, Tanner & Associates, 1987.

Figure 4 Comparison of Numbers of Operations vs. Numbers of Hours Flown for Same System Plan

Finally, in addition to quantifying the data generated by an inventory of helicopter operational statistics, a qualitative assessment of the nature of the operations and hours is necessary. The conditions under which those hours are flown, i.e., whether instrument or visual, night or day, and even time of day, and day of the week must be identified. Additionally the specific origins and destinations, the number of passengers and/or type of cargo, further define the overall helicopter operational characteristics within the area under study.

It is important to have an accurate knowledge of the types of helicopter landing facilities located in the planning area. Helicopter landing facilities include private or restricted use heliports, public use heliports and heliports located at airports, as well as any significant pattern of temporary use facilities frequently used for landings.

Integration with other aviation plans that affect the area should be considered in the analysis of the overall aviation environment. Typically, such plans would include a state aviation system plan, a master plan of a local airport, or even an on-going project or draft document.

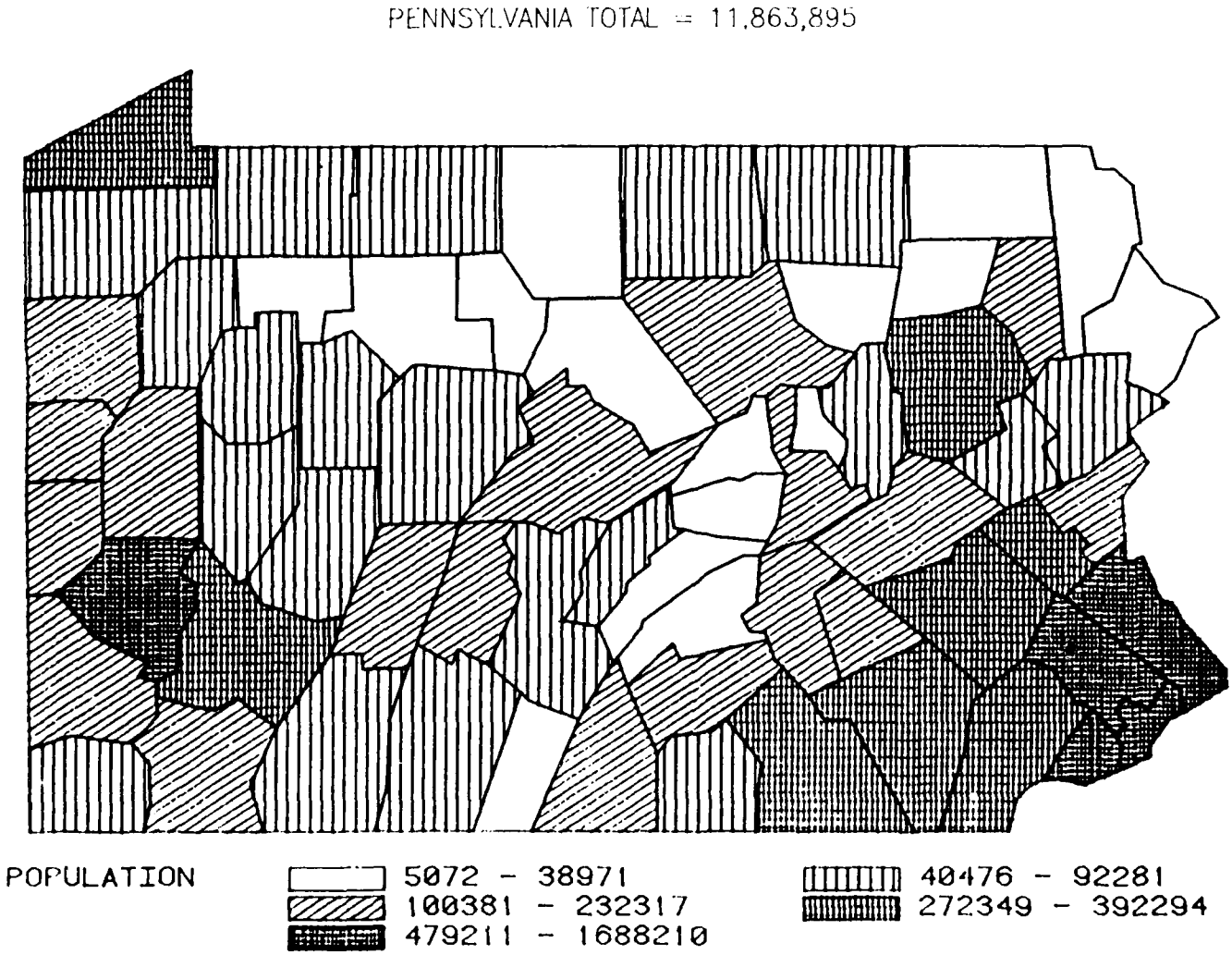
Socio-economic information about the planning area is essential in understanding the social dynamics within which helicopters operate. This includes identifying the types and the distribution of industries using helicopters, as well as the economic health of those industries and the economy in general. Although there is no proven statistical correlation between helicopter use and any particular industry, except perhaps energy exploration and offshore oil, helicopter use can be assumed to be generally associated with the economic strength and viability of industry in any given area.

These basic concepts hold true for demographic profiles as well. Profiles of employment and income levels and patterns, as well as population growth trends, and urban and rural population distribution, are important in understanding the social context in which rotorcraft operate. Figure 5 is a sample population map of a state by county. These types of data give a good indication of population concentrations for planning purposes and may be significant to later forecasting.

Land use patterns and distribution, as a cross check to current helicopter operational patterns, are a good indicator of future trends in the overall transportation system.

Description of Existing System

This section is a description of the helicopter activity in the planning area determined from the information gathered in the inventory phase (Table 2.3). It takes all the various facts and creates an overview of the related systems from the perspective of helicopter operations. It should present a picture of helicopter operational characteristics within the transportation infrastructure, as well as within the context of the social and economic environment.



Source: Pennsylvania Heliport System Plan, Hoyle, Tanner & Associates, 1987.

Figure 5 Total Population by County

TABLE 2.3 PLANNING CONCEPTS FOR DESCRIPTION OF EXISTING SYSTEM

Description of Existing System

A. Role of Heliports and Airports
    1. Overall Transportation System
    2. Helicopter Operations
    3. Services Available (fuel, maintenance, etc.)
B. Operational Characteristics (inventory summary)
    1. Types of Helicopters
        a. Critical Helicopter
        b. Fleet Mix
    2. Trip Length/Time
    3. Primary Uses
    4. IFR
    5. Night
C. Demand Analysis
    1. Operations Between Specific Origins and Destinations
    2. Preferred Heliport Locations (from survey results)
    3. Estimate of Number of Operations to Preferred Location
    4. Latent Demand
    5. Profile of Demand Centers
        a. Central Business District (CBD)
        b. Industrial Parks
        c. Employment/Business Activity Centers
        d. Suburbs
        e. Other
E. Benefits to the Community
    1. Direct vs. Indirect
    2. Public Service
    3. Financial
    4. Economic Development Strategy

This section should contain a detailed description of the types of helicopter landing facilities, i.e., private or restricted-use heliports, public use heliports and those on airports, and how they support the overall transportation system. It should include a profile of the typical operational characteristics of the active helicopter fleet, including: types and number of helicopters, numbers of operations, hours flown, average trip length and time, primary use, and percent of IFR (Instrument Flight Rules) and night operations.

The overall demand for helicopter landing facilities is developed in this section. This is achieved through analysis of the current number of operations and the pattern of origins and destinations. Latent demand - the demand that would be generated by the existence of new landing facilities - should be an important element in this analysis.

Identification of the location of the highest demand for heliport facilities, or demand centers, is a part of the analysis. It should also include a brief description of the nature or characteristics of those areas where that demand is located. For instance, is the highest demand for heliports in the central business districts (CBDs), industrial parks,

suburban activity centers, etc.? A discussion of the infrastructure of other transportation modes is essential. Locations of public use heliports must interface with these other modes so that they can enhance the urban transportation system. Figure 6 illustrates an urban transportation infrastructure, including both the ground transportation and the air transportation of a metropolitan area.

An important consideration is the development of a general awareness of the value of the helicopter to the community. A discussion of these benefits can be presented in terms of public service functions (including law enforcement and medical transport), financial considerations and economic development strategies. This effort is absolutely crucial to the success of heliport development on any scale. While the social costs of heliports in a community (the "down side") is readily apparent to the public, particularly in terms of noise and anxiety, the benefits that balance the cost/benefit equation (the "up side") are not so readily apparent. They are, for the most part, indirect and consequently much more difficult to present in an understandable and acceptable form.

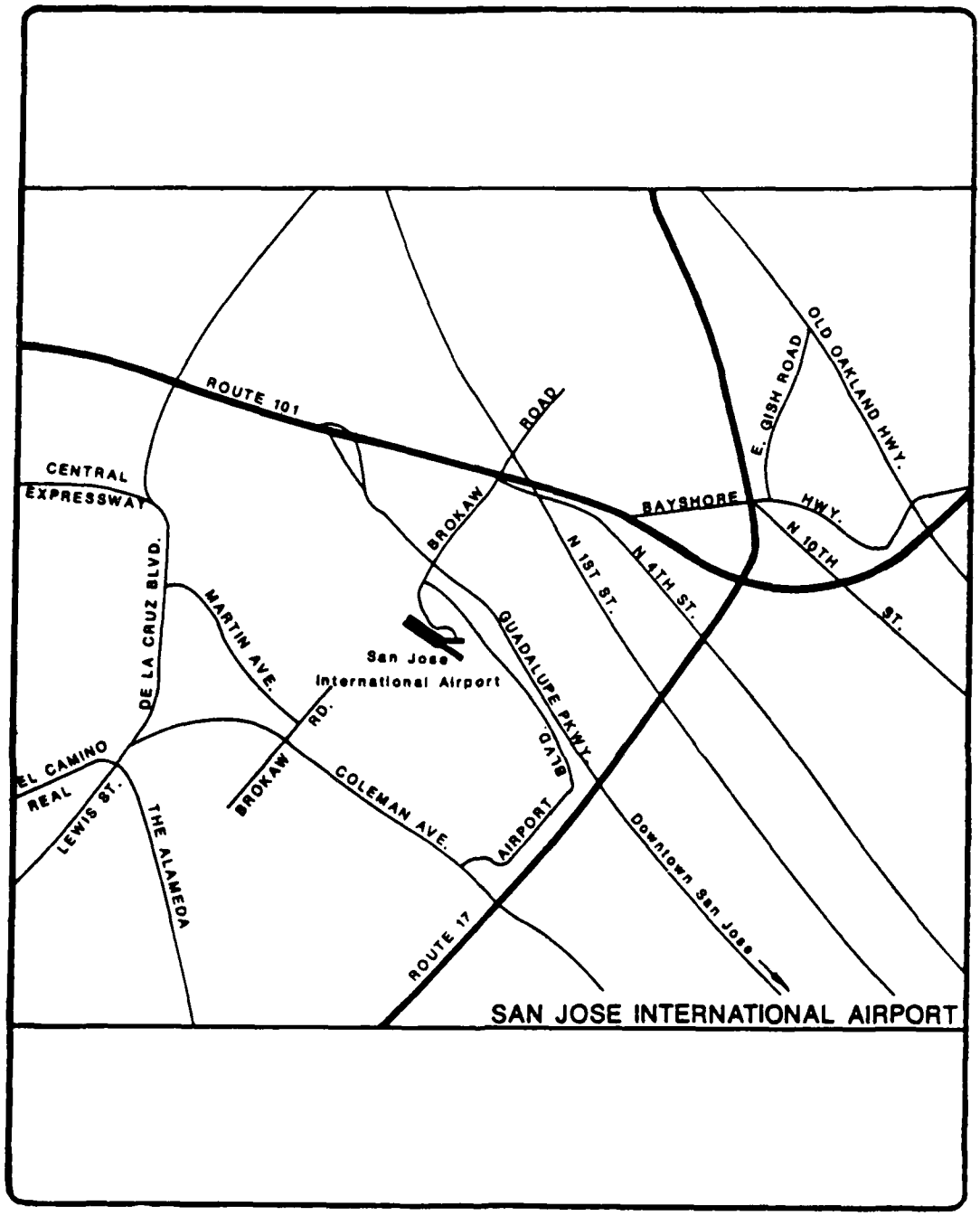
In summation, this section presents a description of the overall characteristics of the existing system and lays the groundwork for the prioritized integration of the recommended helicopter system plan into the evolving urban environment and transportation network.

Forecasts

Forecasting the expected number of helicopters and the profile of their activity is the interface between data collection and developing the recommendations for the future system plan (Table 2.4). Forecast periods, usually of 5, 10 and 20 years, should be identified so that priorities can be established regarding the implementation of these recommendations. Forecasts are based on the data collected in the inventory, including both the operational and socio-economic data.

One of the greatest problems with heliport system plan forecasting is the lack of sufficient data on activity. Very often the number of registered helicopters located in a particular area are the only data available. Unfortunately, this too, is often an unreliable number and therefore cannot be used as an accurate indication of "based" helicopters. Many times a helicopter will be registered in one area or state, yet operated in another. For example, there are several financial holding companies in San Francisco, California, who own a fleet of helicopters that are registered in California, yet these aircraft are operated in the Gulf of Mexico. This type of unreliable data can skew attempts at effective forecasting.

Sometimes the only way to gather significant data is by sampling. A helicopter operator survey, whether by mail or telephone, may be the only way to gather information pertinent to reliable forecasting. The third report in this series, "Heliport System Planning Guidelines", (DOT/FAA/PM-87/33), (DOT/FAA/PP-88/3), discusses surveying techniques in detail.



Source: Heliport System Plan for Santa Clara County, Hoyle, Tanner & Associates, 1986.

Figure 6 Urban Transportation Infrastructure

TABLE 2.4 PLANNING CONCEPTS FOR THE FORECASTS

Forecasts

A. Methodologies
B. Data Sources
C. Forecast Period
D. Based/Active Helicopters (in appropriate geographic area)
    1. Number
    2. Type
    3. Primary Use
E. Operations
    1. Total Numbers
    2. Average Month
    3. Peak Month
    4. Annual
    5. Primary Purpose
    6. IFR
    7. Night
    8. Passengers
F. Total Hours Flown
    1. Average Month
    2. Peak Month
    3. Annual
    4. Primary Purpose
    5. IFR
    6. Night
    7. Passengers
G. Heliports
    1. Number of Operations
        a. Average Month
        b. Peak Month
        c. Annual
    2. Night Operations
    3. IFR Operations
    4. Passenger Enplanements

A discussion of the forecast methodologies and data sources should be included. It is essential to define the relationship between the economic trend factors used to indicate growth or decline and the actual items forecasted, e.g., numbers of helicopters, operations, primary use, etc.

Forecast of growth should include the number of active helicopters by type of helicopters. The numbers of operations and hours flown should later be evaluated by total number, primary use, percent of night and IFR operations, passenger enplanements, etc.

Expected increase or decrease of activity at existing helicopter landing facilities by number of annual and monthly operations, and the percent of night and IFR activity, as well as the number of passengers enplaned should be included in the forecast. Figure 7 illustrates the forecasts for the expected number of annual and daily passengers and operations to specific potential heliport sites.

Heliport Location	Annual Passengers	Annual Operations	Daily Passengers*	Daily Operations*
1988				
Portal**	130,076	26,350	417	85
Union Station**	117,748	24,292	337	78
Coal Yards©	117,748	24,292	337	78
1993				
Portal**	207,764	43,382	666	139
Union Station**	188,528	40,412	604	130
Coal Yards©	188,528	40,412	604	130

*For a typical day.
**From Tables I-E-1, I-E-2, I-E-3 and I-E-4.
©Because of the proximity to Union Station, the Coal Yards site traffic is the same as that for Union Station.

Source: Washington, D.C. Heliport Study, Howard, Needles, Tammen & Bergendoff, 1984.

Figure 7 Table of Forecast of Total Operations and Passengers to Specific Sites

Regulatory Review

An important consideration in developing a heliport system plan is the understanding of the regulatory considerations at all governmental levels (Table 2.5).

The Federal Government is the primary regulator of all airborne aviation activity. This is accomplished through laws, rules, standards and guidelines. The Federal Government is also a possible source of funding for heliport developers. Applicable Federal regulations should be thoroughly understood in developing the heliport aviation system plan.

Some states have aeronautical agencies that issue rules and regulations regarding aircraft operation and heliport development. Many states also have sources of funds for airport/heliport construction. It is therefore important to consider the role the state plays in aviation development in the planning region.

Local communities often do not have laws pertaining directly to aviation operations, but they do have building codes and permit requirements, construction guidelines, and zoning laws that affect heliport establishment or even specifically prohibiting heliports. These need to be identified for future analysis and system recommendations. Figure 8 is a sample of identified local regulations for individual communities in a planning region. However, even if there are no defined laws on heliport development, it essential to know the local attitudes and political climate of the area in which any heliport development is planned.

TABLE 2.5 PLANNING CONCEPTS FOR REGULATORY REVIEW

Regulatory Review

A. Federal
    1. Agencies
    2. Regulations
    3. Guidelines (Advisory Circulars, etc.)
    4. Funding Sources
    5. Development Assistance Sources/Agencies
B. State Aviation Agency
    1. Regulation
    2. Assistance
    3. Guidelines
    4. Funding
C. Local
    1. Ordinances
        a. Zoning
        b. Noise
        c. Safety
        d. Fire
    2. Building Permits
    3. Attitudes/Political Climate

LOCAL JURISDICTION	PERMITTED USE	CONDITIONAL USE PERMIT REQUIRED	NO ESTABLISHED REGULATIONS	COMMENTS
1. CAMPBELL			X	
2. CUPERTINO			X	
3. GILROY			X	
4. LOS ALTOS			X	
5. LOS ALTOS HILLS			X	
6. LOS GATOS			X	
7. MILPITAS		X		After public hearing, may permit aircraft landing field in district from which they are prohibited where deemed essential or desirable and in harmony with general plan.
8. MONTE SERENO			X	
9. MORGAN HILL			X	
10. MOUNTAIN VIEW		X		Heliport not a permitted use in any district until a conditional use permit has first been secured. City staff indicates that only hospital heliports are allowed in office and research districts. Government owned heliport may be allowed in public facilities district.
12. SAN JOSE			X	
13. SANTA CLARA			X	
14. SARATOGA			X	
15. SUNNYVALE			X	
16. SANTA CLARA COU		X		Airport (heliport) may be established in any zoning district except Hillside Slope (HS) district subject to securing of a use permit.

Source: Heliport System Plan for Santa Clara County, Hoyle, Tanner & Associates, 1986.

Figure 8 Table of Local Government Regulations Relating to Heliport/Helistop Development

Heliport Design/Planning Criteria

Heliport design criteria (Table 2.6) include all the concepts that go into the construction of a facility, including total real estate requirements, nature and placement of approach/departure paths, FAR Part 77 obstruction regulations, IFR landing capability, critical helicopter requirements, imaginary surfaces, prevailing winds, etc. Heliports can be either constructed at ground level or on rooftops; therefore it is useful to know the advantages and disadvantages of each of these types of facilities.

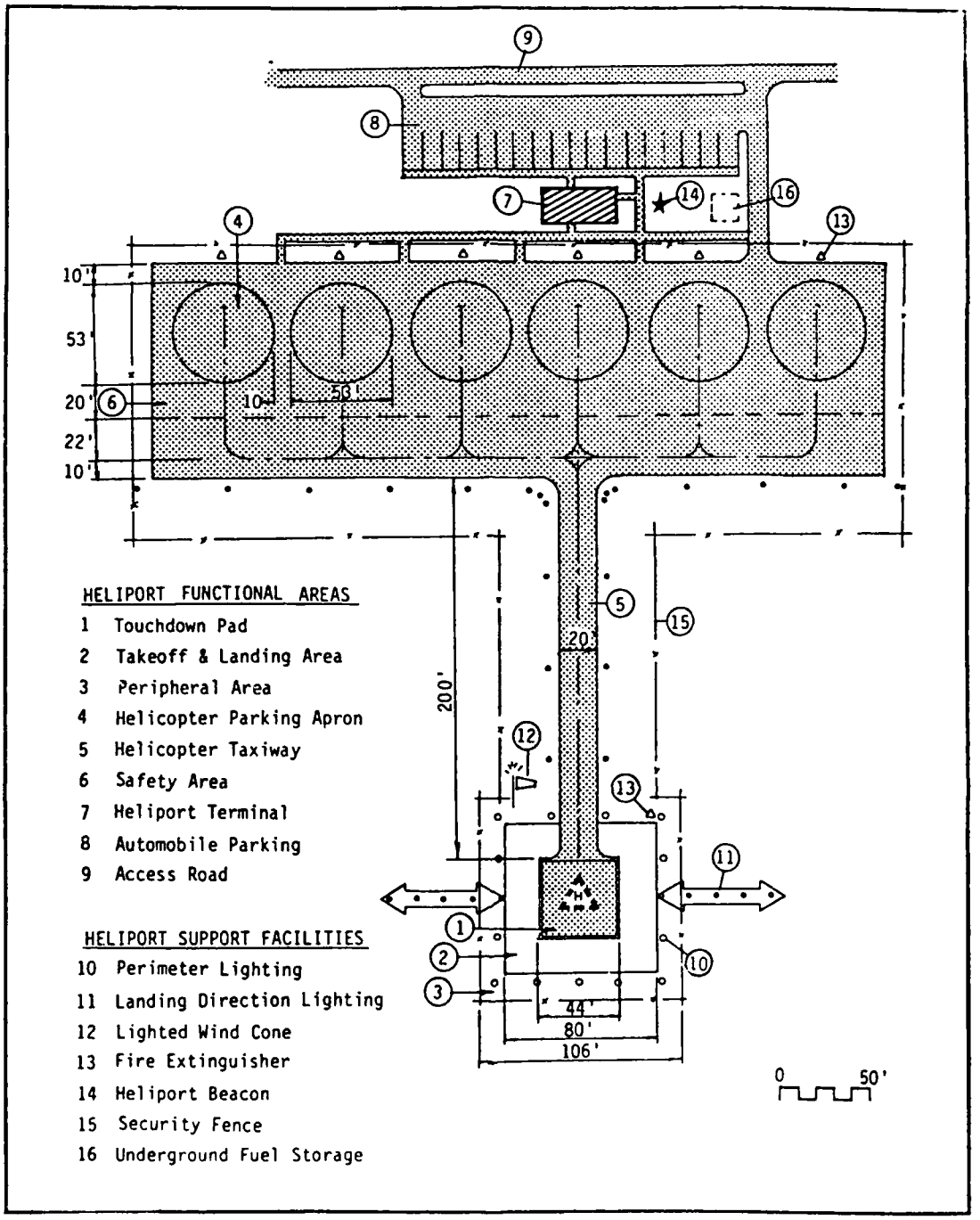
Model heliports can be designed using the FAA Advisory Circular, "Heliport Design", FAA AC 150/5390-2, January 1988, for the use and type of heliport facilities appropriate for the area under study. Figure 9 is an example of such a model (using the 1977 guidelines, which were in effect at the time).

In conjunction with the above, heliport siting criteria must be understood. These include compatible land uses, environmental considerations, and any state or local legal considerations.

TABLE 2.6 PLANNING CONCEPT FOR HELIPORT PLANNING CRITERIA

Heliport Planning Criteria

A. FAA Advisory Circular - Heliport Design
    1. Approach Departure Path
        a. Obstructions
        b. Imaginary Surfaces
        c. Prevailing Wind
    2. Conceptual Layout
        a. Ground Level
            1) General Characteristics
            2) Advantages/Disadvantages
        b. Rooftop
            1) General Characteristics
            2) Advantages/Disadvantages
        c. State Standards
        d. Local Standards
B. Land Use
    1. Local Area Characteristics
        a. Heliport Compatible
        b. Heliport Non-Compatible
    2. Regulatory Compliance
        a. Permitted Use
        b. Variance Required
        c. Prohibited Use



Source: Downtown Pittsburgh Heliport Site Location Study, Aviation Planning Associates, 1987.

Figure 9 Prototype Heliport Facility Requirements

Airspace

This section should describe the existing airspace elements (Table 2.7) that are in place within the infrastructure of the present operational system of airports and heliports. The description should include the types of airspace and how helicopter operations fit in. This section should serve as a foundation for any changes that the recommended system plan may implement. Figures 10 through 12 are samples of some airspace considerations that need to be identified.

TABLE 2.7 PLANNING CONCEPTS FOR AIRSPACE REVIEW

Airspace

A. Pertinent Airspace Classifications
B. Helicopter Operation Within Existing System
    1. ATC Requirements
    2. Letters of Agreement

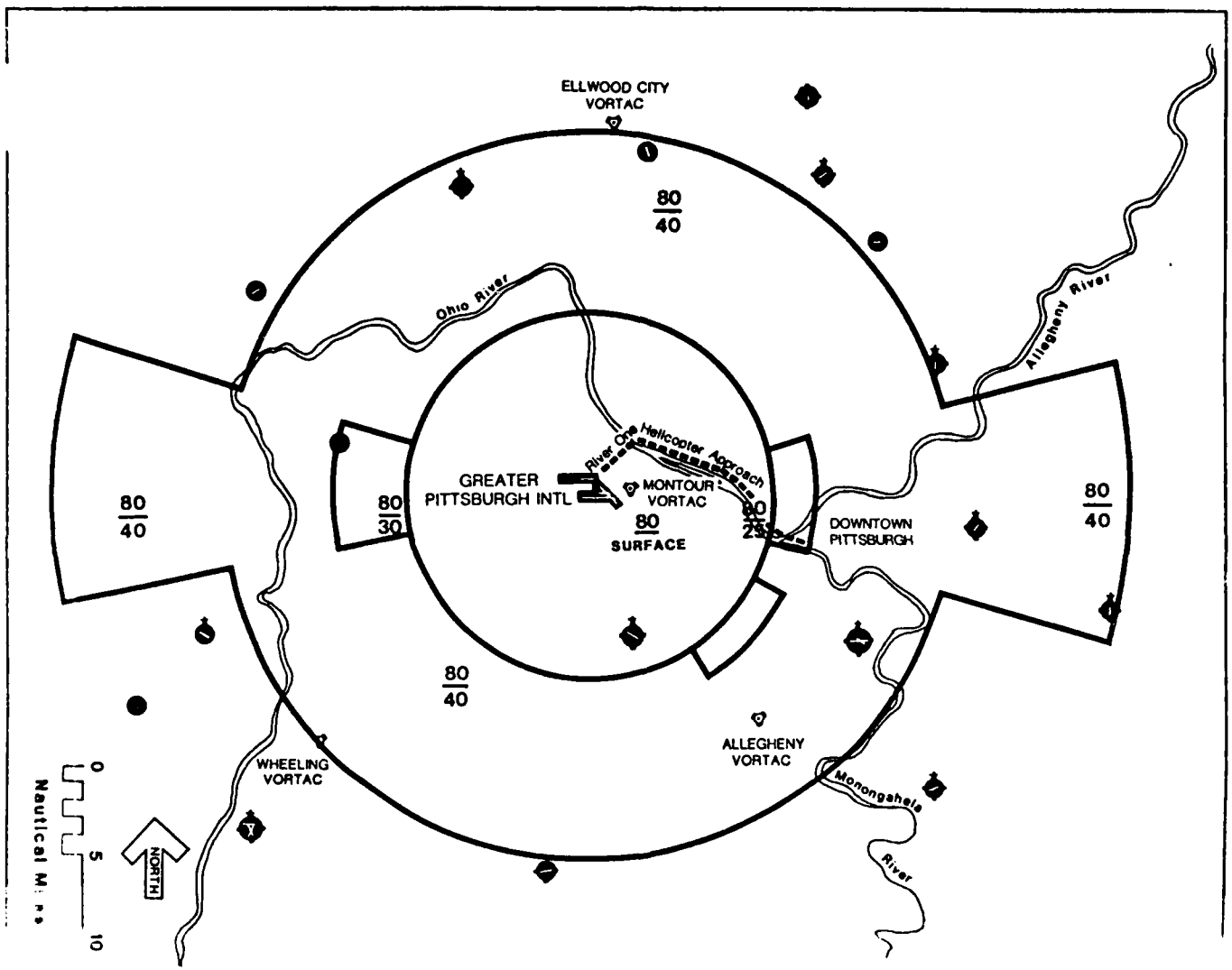
Environment

Environmental considerations (Table 2.8) are of extreme importance with regard to helicopter operation and heliports. The public often perceives helicopter operation in urban areas as a noisy intrusion and as a safety risk. Therefore, noise and safety should be major considerations. This section should be developed as part of the siting criteria for potential heliports used in the recommended system plan. Figure 13 illustrates how noise contours can be used so that the impact of the potential heliport can be determined for community planning.

TABLE 2.8 PLANNING CONCEPTS FOR ENVIRONMENTAL REVIEW

Environment

A. Noise
    1. Community Perception
    2. Methodology of Measurements
    3. Impact
    4. Mitigation
B. Safety
    1. Community Perception
    2. Mitigation
C. Other Relevant Impacts



Source: Downtown Pittsburgh Heliport Site Location Study, Aviation Planning Associates, 1987.

Figure 10 Greater Pittsburgh Group II TCA

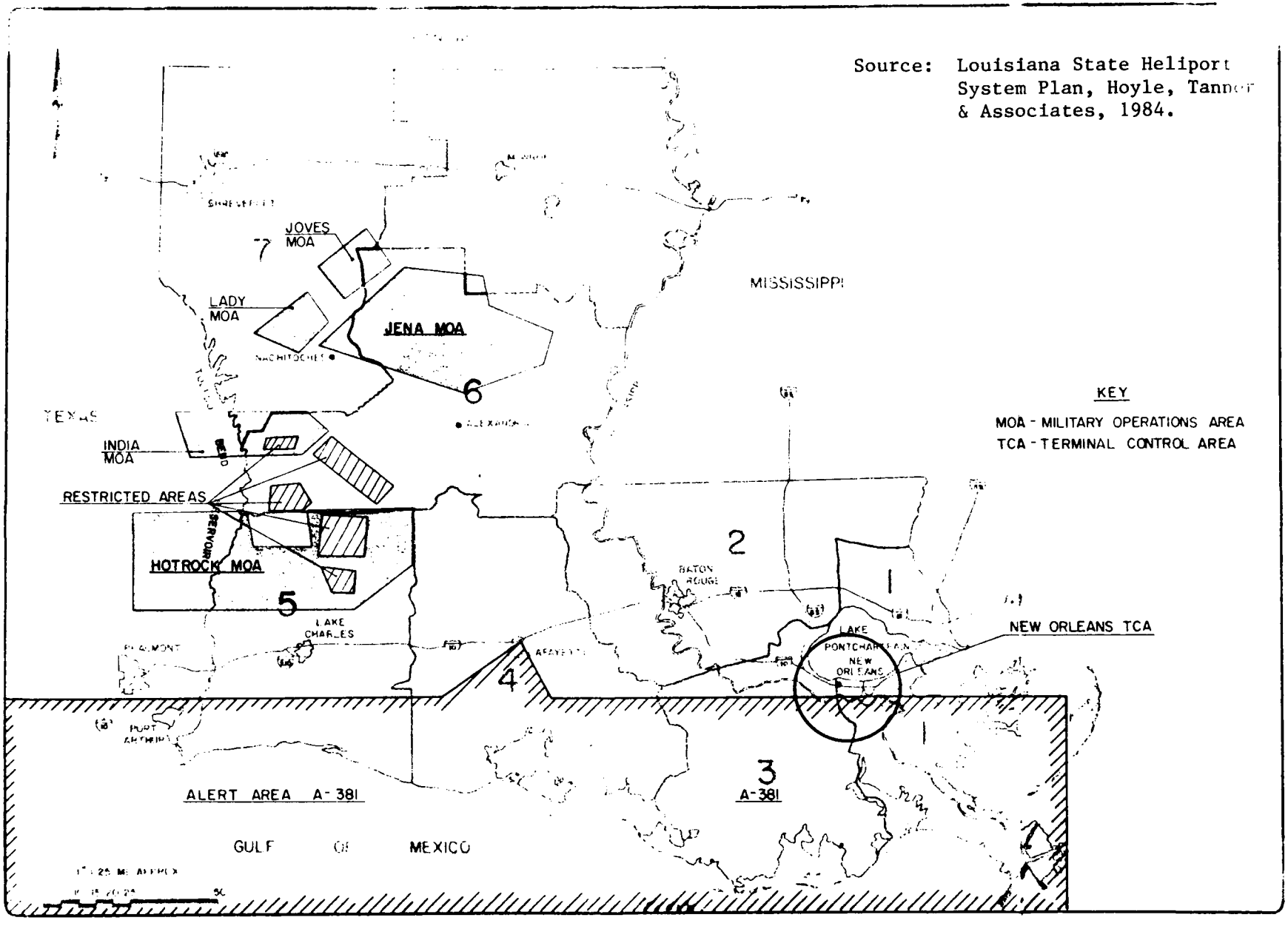
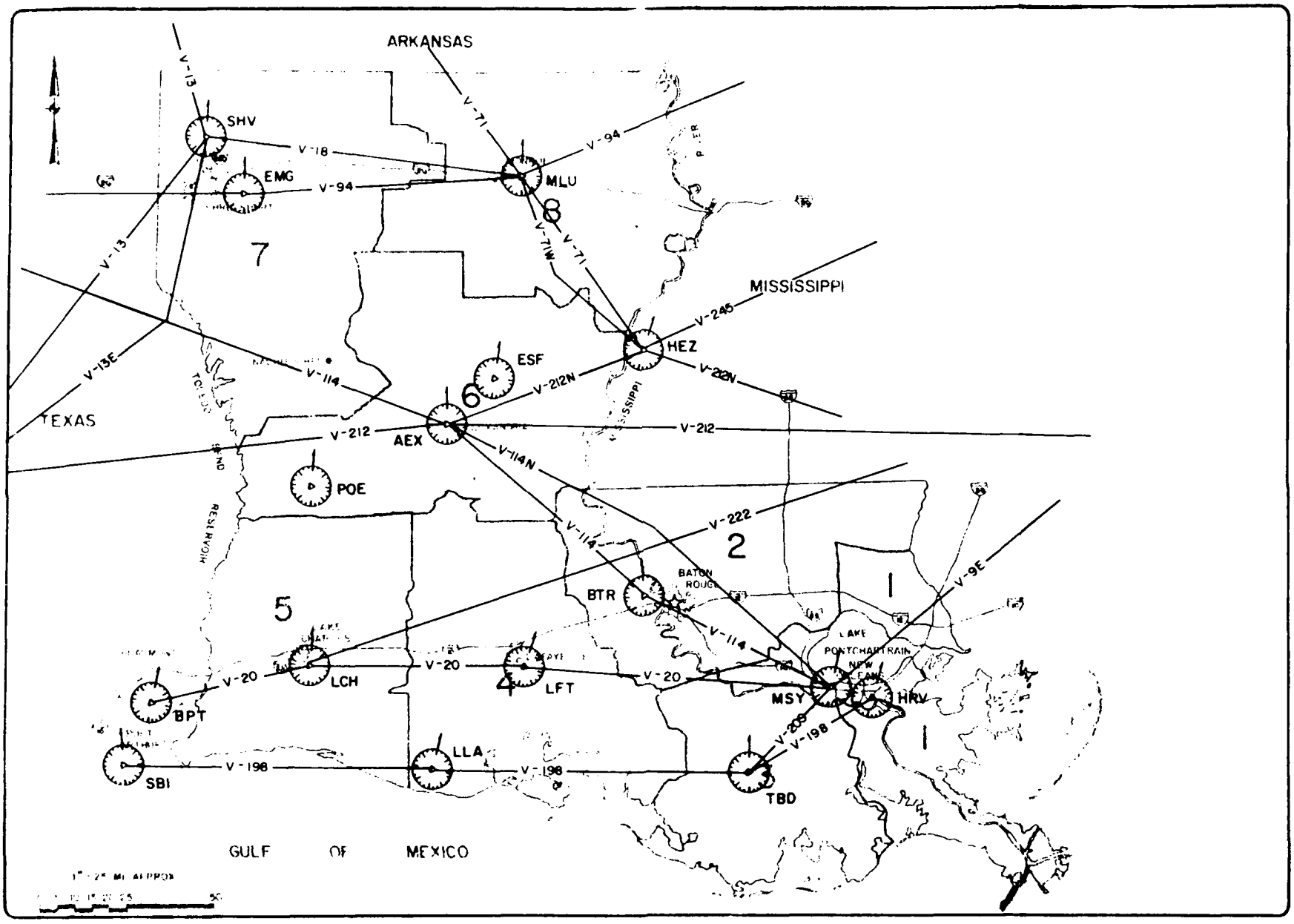
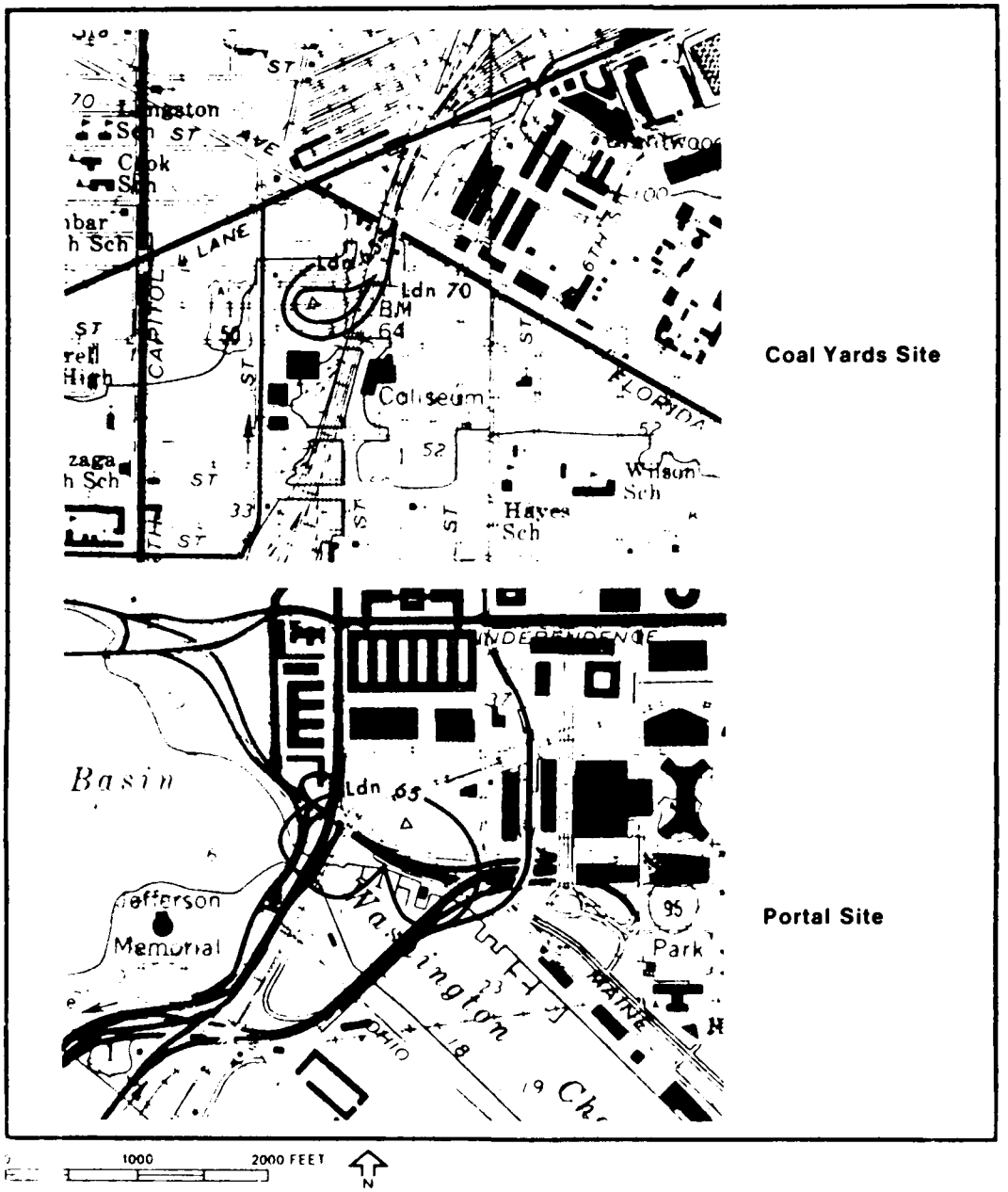


Figure 11 State of Louisiana Planning Districts Special Use Airspace



Source: Louisiana State Heliport System Plan, Hoyle, Tanner & Associates, 1984.

Figure 12 Navigation Aids and Federal Airways



Source: Washington, D.C. Heliport Study, Howard, Needles, Tammen & Bergendoff, 1984.

Figure 13 Noise Contours

Recommended System Plan/Facility Requirements

This section presents, within the scope and purpose, the findings and recommendations of the heliport system plan. These findings are based on the careful analysis and evaluation of all the previous sections. The elements to be considered are found in Table 2.9. Site selection and selection criteria identification are a vital part of this analysis. Site selection criteria must be appropriate to the area under study, and individual characteristics considered. Figure 14 presents sample site selection criteria used in a metropolitan plan for one of the sites it evaluated.

An important part of this evaluation is a presentation of how the recommended heliport system plan will integrate into the existing transportation network. This evaluation should incorporate airports, existing heliports, as well as ground transportation. An example of an integrated system is shown in Figure 15.

The recommended system plan should delineate the role of the various participating governmental entities, particularly that of the sponsoring agency. It should discuss the priority of implementation of the recommendations, based on the parameters of demand and economic criteria developed in the previous sections.

This section should address specific costs to the level of detail specified in the statement of purpose. This could include cost of site acquisition, development and implementation, and if applicable, construction costs and management costs. Figure 16 illustrates some of the costs that were considered in comparing potential public use heliport sites to the detail level specified in one metropolitan heliport plan. Also pertinent are Federal, state, and local funding sources, and the revenue to be generated by the facilities to be established.

Specific implications of the recommended plan on the existing airspace and environment should be discussed in detail, using the previously described existing system as a baseline. Flight tracks, noise contours, land use, and detailed safety procedures, should be considered where applicable. Figures 17 through 20 are samples of such criteria used to illustrate the implications of a recommended plan for various sites. Figure 17 shows the routes to a site and the percentage of traffic expected to use each route. Figure 18 presents the surrounding land use of a potential heliport site. Figures 19 and 20 are interconnected, the first shows the general vicinity and the siting of the approach/departure paths, and the second shows the how the heliport facilities would be laid out at that site.

Possible impact on the system of future technological improvements within the duration of the planning period(s) should also be addressed.

TABLE 2.9 PLANNING CONCEPTS FOR RECOMMENDED SYSTEM PLAN

Recommended System Plan

A. Site Selection Process
    1. Origins and Destinations
    2. Site Selection Criteria
        a. Aeronautical Considerations
        b Operational Considerations
        c. Comm/Nav/Surveillance (CNS) Coverage
        d. Transportation Interfaces
    3. Evaluation Matrices
        a. Identification of All Possible Sites
        b. Site Selection
B. Recommended Facilities
    1. Number
    2. Location
    3. Size
        a. Critical Helicopter
        b. Number/Size Touchdown Pad
    4. Facility Category
        a. Public Use Heliport
        b. Private Use Heliport
        c. On Airport Heliport
    5. Services Required
        a. Fuel
            1) Grades
            2) Amounts
        b. Parking and Tie-Downs
        c. Hangar Storage
        d. Lights
            1) Types
            2) Configurations
            3) Controls
        e. NAVAIDS
        f. Surveillance Facilities
        g. Communications
        h. Weather Services and Facilities (AWOS)
        i. VFR/Special VFR
        j. IFR Capabilities
            2) Non-precision
            3) Precision
        k. Terminal Building
            1) Passenger Amenities
            2) Pilots Lounge
            3) Flight Planning Facilities
        k. Maintenance
        l. Connecting Transportation
            1) Auto Parking
            2) Rental Cars
            3) Taxi Stand

TABLE 2.9 PLANNING CONCEPTS FOR RECOMMENDED SYSTEM PLAN (CONTINUED)

C. System Integration
   1. Integration With Existing Transportation Network
      a. Airports
      b. Existing Heliports
      c. Ground Transportation
   2. Airspace Impact
   3. Environmental Impact
   4. Possible Impact of New VTOL/VSTOL Technology on System
D. Implementation
   1. Priority of Development
   2. Costs
      a. Construction
      b. Management
   3. Funding
   4. Sources of Revenue
   5. Role of Government Entities
      a. Federal
      b. State
      c. Local
   6. Recommended Regulatory Changes
E. Benefit to Community of New System

The benefits to the community that result from the implementation of these recommendations are a necessary part of the discussion. The ramifications of the overall efficency of the integrated transportation network, as well as its contribution to public service, current financial concerns, and future business development should be investigated.

To fulfill its purpose, this section should integrate all the diverse concepts into a comprehensive recommendation for the implementation of all necessary systems and facilities to support helicopter operations in an urban transportation network.

2.3 SYSTEM PLAN RANKING SCHEMES

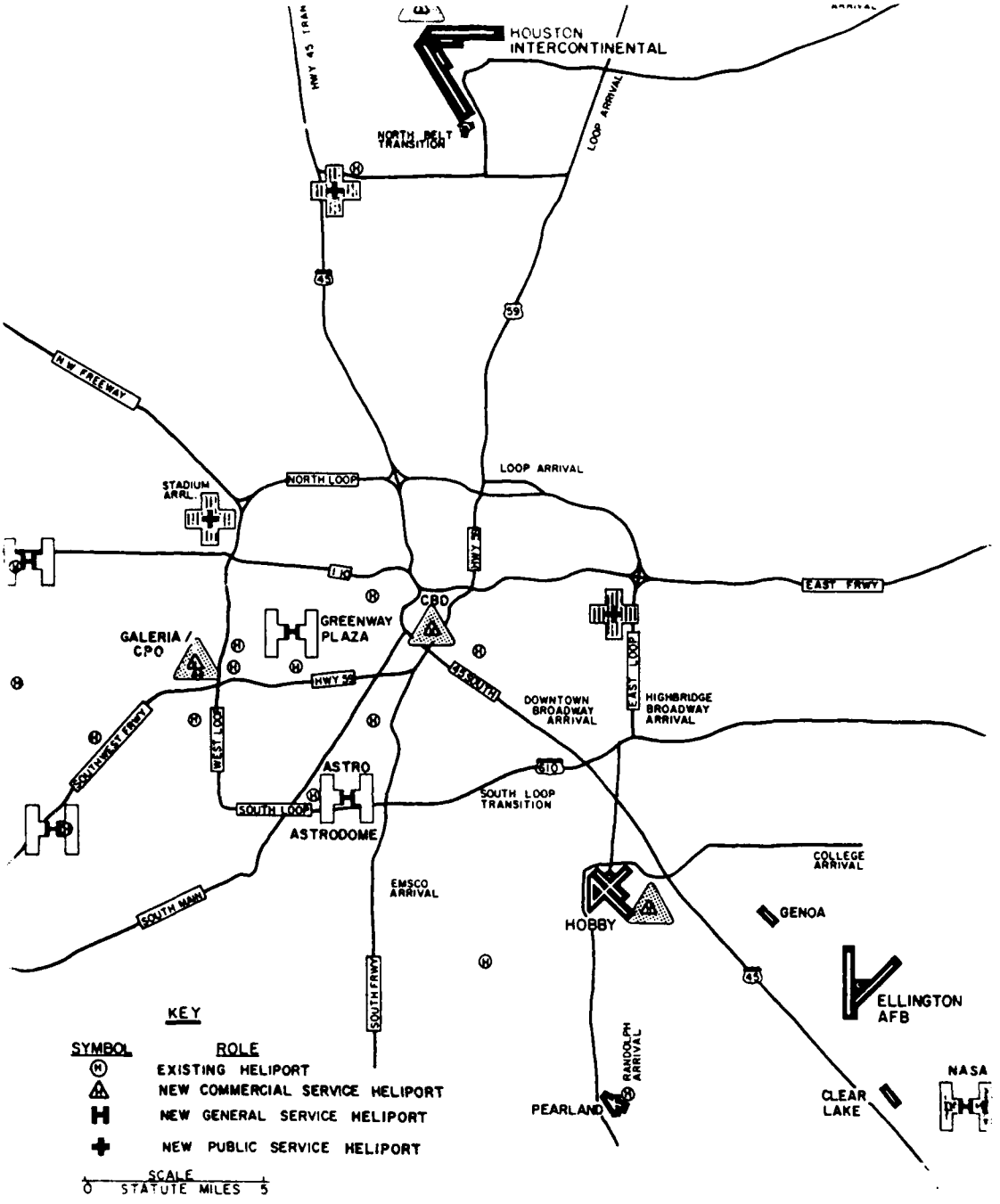
Using the standard planning concepts as baseline comparative data, this section presents a ranking scheme to evaluate the strengths and weaknesses of the existing heliport systems plans (Table 2.10). Each element is assessed on its organization, completeness, analytical depth and clarity, conciseness, validity of conclusion, and conformance with the components detailed in the last section. Each element is ranked from 1 - 4 as shown below.

Rank 4 - complete. (All the components have been presented in a well organized manner and are used to further the development of the system plan to the fullest extent possible, could be used as a standard.)

Description of Surviving Heliport Sites	
Site Location	The Portal Site, 12th, 14th, D Streets, Maine Avenue, SW.
Size	10.7 Acres
Site Characteristics	The site is located at one approach to the 14th Street Bridge and is bisected by a railroad running from the Northeast corner to the Southwest corner. The site is generally flat though there is a small rise in the Southwest corner.
Owner	D. C. Redevelopment Land Agency.
Current Development	Both parcels are currently used for parking.
Proposed Development	Banaker Associates had received the rights to develop the site after having proposed an office building/hotel complex containing over 2 million s.f. They were unable to finance their development and the site has reverted back to DCRLA.
Zoning/Planning	U.R.
Adjacent Land Use	Office buildings to the West, North and East, arterial streets to the West and South and the waterfront to the South.
Roadway Access	14th Street on the West, 12th Street on the East, Maine Avenue on the South, and D Street on the North.
Nearest Metro Station	Smithsonian Metro Station (1600')
Nearest Fire Station	450 D St. S.W. (2200') and the D. C. Fire Dept. fire boat.
Relationship to P-56	Outside of P-56.
Adjacent Tall Buildings	8 story Bureau of Engraving and Printing Bldg. on north side; 9 story office building on east side; 5 story office building on west side of 14th St. across from site.
Other Airspace Considerations	Overhead wires run along the railroad tracks.
Distance from Primary Demand Centers 1. 19th & K 2. Capitol Hill	 8100' 6300'
Residential	There is no nearby residential land use.
Nearby Historic Structures/Districts	None
Other Factors	Site has good air access since it is on the river, however, it is close to National Airport flight traffic.

Source: Washington, D.C. Heliport Study, Howard, Needles, Tammen & Bergendoff, 1984.

Figure 14 Table of Sample Site Selection Criteria



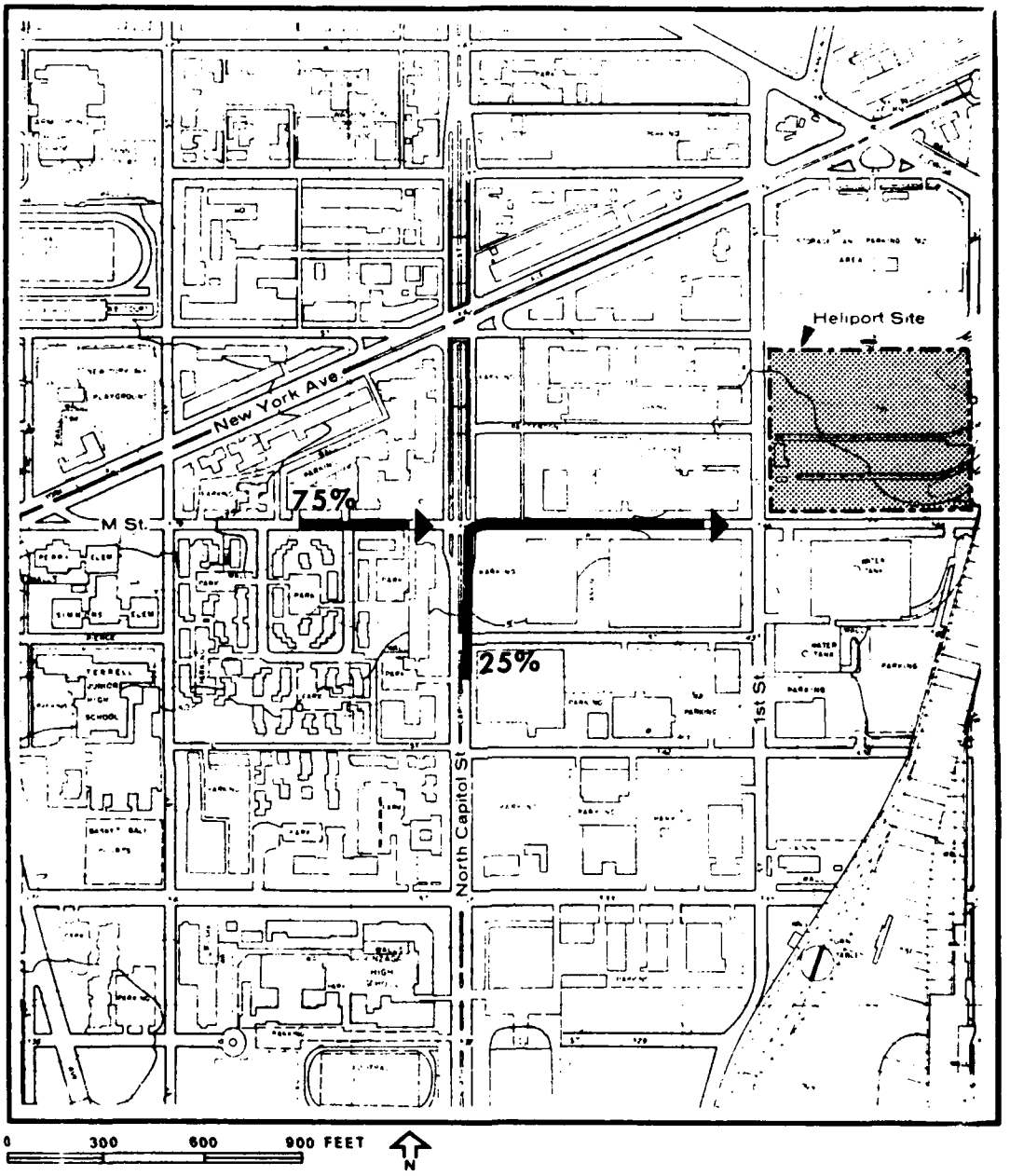
Source: Metropolitan Heliport System Plan, City of Houston, Hoyle, Tanner & Associates, 1984.

Figure 15 An Integrated Urban Transportation Network

Item	Sites ($000) Portal	Union Station	Coal Yards
Demolition and clearing	2	0	32
Structural Modification	0	160	0
Access and Parking	106	0	101
Terminal	214	201	217
Heliport Pavement	532	0	553
Markings	0	10	0
Fencing	16	5	14
Access Control	0	10	0
Lighting	101	20	136
Visual Aids	88	48	48
Fueling	0	350	0
Fire Protection System	0	100	0
Total	1,059	904	1,101
Engineering and Contingencies @ 15%	159	136	165
Grand Total	$1,218	$1,040	$1,266

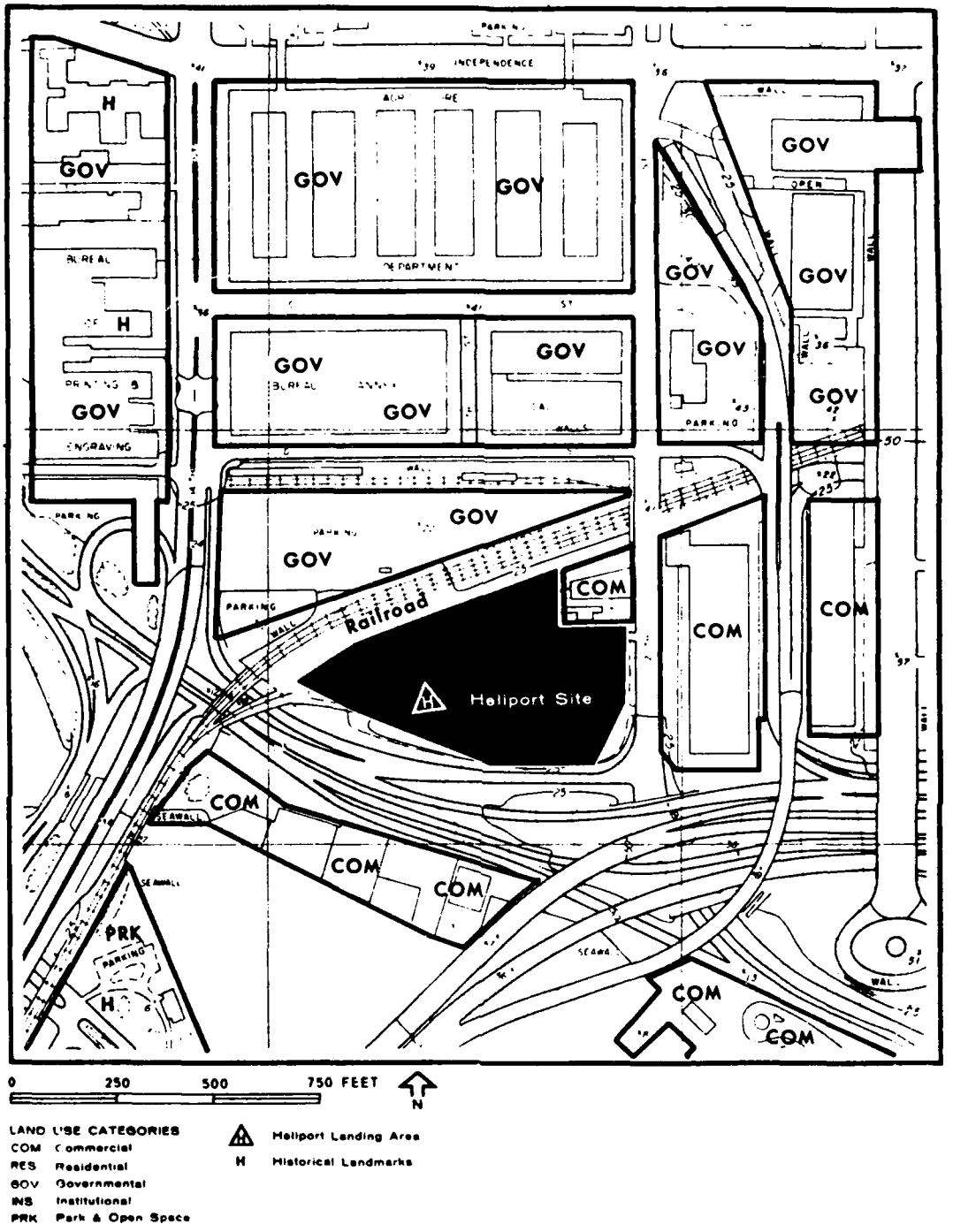
Source: Washington, D.C. Heliport Study, Howard, Needles, Tammen & Bergendoff, 1984.

Figure 16 Table of Sample Construction Costs



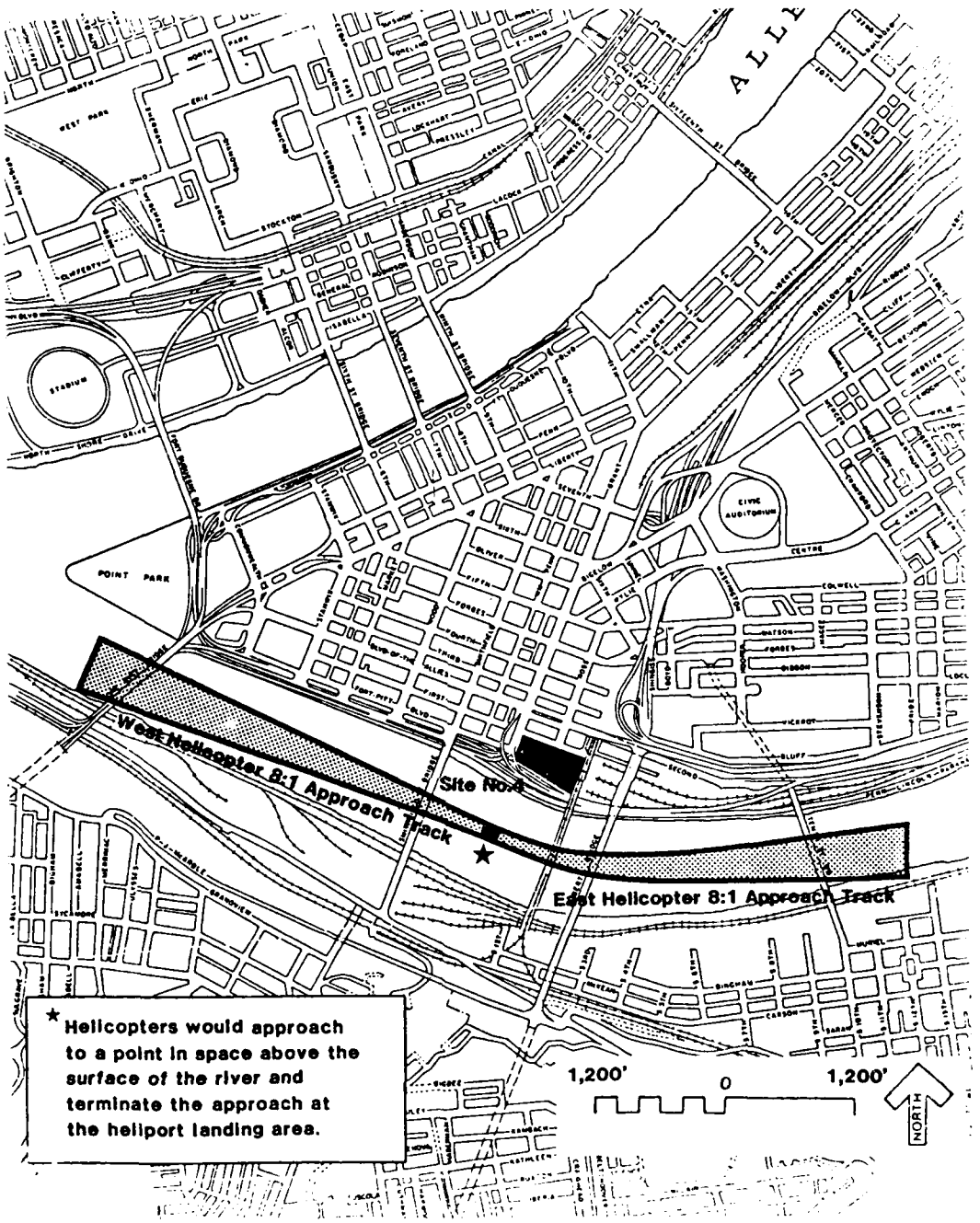
Source: Washington, D.C. Heliport Study, Howard, Needles, Tammen & Bergendoff, 1984.

Figure 17 Direction of Approach of Heliport Vehicular Traffic



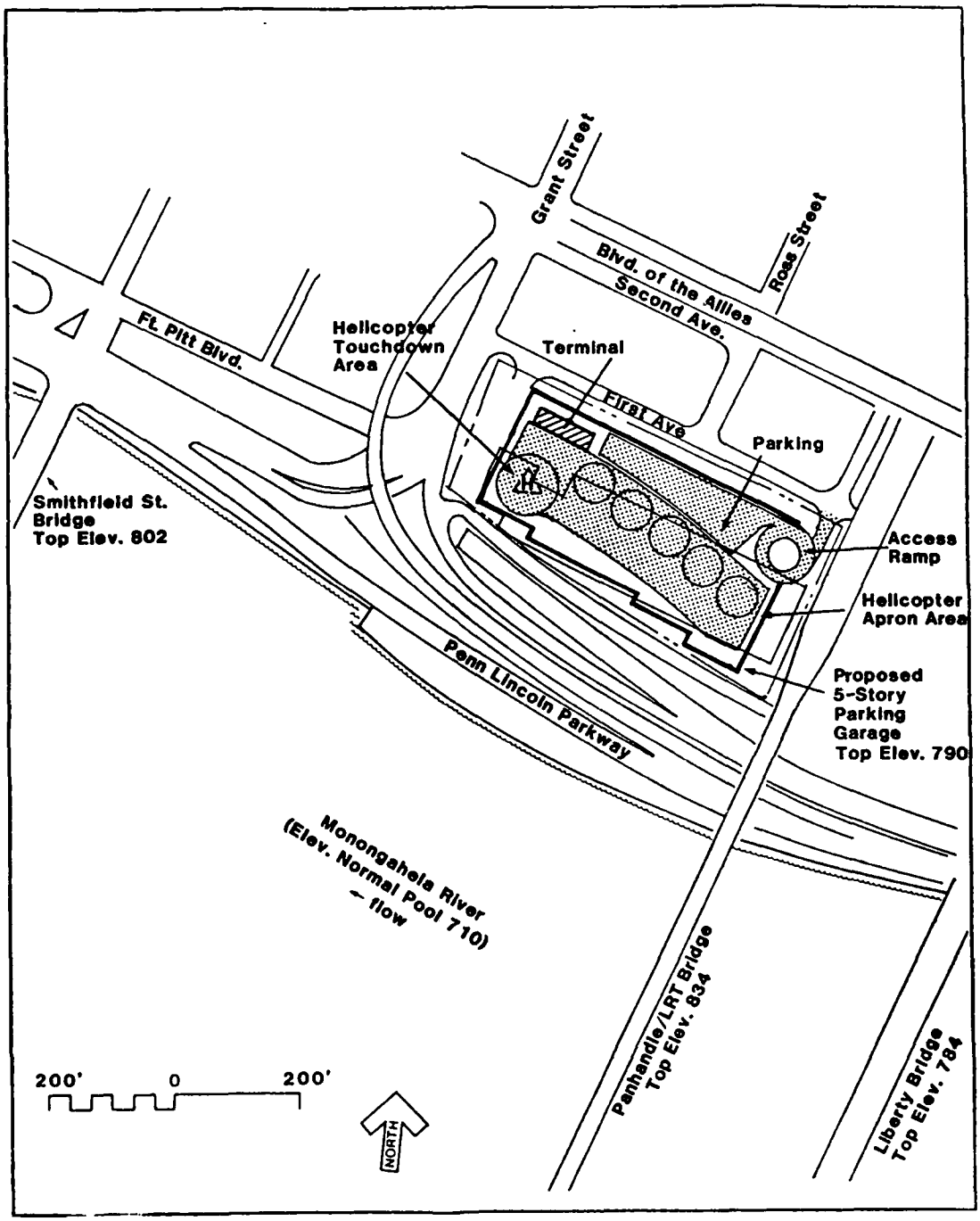
Source: Washington, D.C. Heliport Study, Howard, Needles, Tammen & Bergendoff, 1984.

Figure 18 Land Use in the Vicinity of Potential Heliport Site



Source: Downtown Pittsburgh Heliport Site Locations Study, Aviation Planning Associates, 1987.

Figure 19 Heliport Vicinity and Approach/Departure Paths



Source: Downtown Pittsburgh Heliport Site Location Study, Aviation Planning Associates, 1987.

Figure 20 Layout of Heliport Facilities at Specific Site

Rank 3 - adequate. (The section component met all the basic criteria but might have been expanded to a greater extent.)

Rank 2 - incomplete. (The subject component might have been touched on but criteria was lacking or inaccurate.)

Rank 1 - not included. (This element was not included in the plan.)

It must be stressed that the numerical rank of the individual sections should not be considered additive. Some are the first heliport plans ever attempted. There had been no specific guidelines for heliport planning established, and as a result, the consultants adapted strategies and methods from their airport planning experience. Furthermore, each consultant, and each plan, dealt with diverse state or local entities who had varied purposes, and also had no experience with the specifics of heliport planning requirements. The result, at times, was limiting. Emphasis was based on the client's priorities for the elements of data collection and analysis. The purpose of the ranking system is to indicate the elements that were most complete, and not as a means of "grading" the abilities of the consultants. An element may be ranked low because the sponsor specifically did not wish that element to be investigated or because it was not applicable to the situation, i.e., the Washington, D.C. did not need to investigate state regulations. A prime example is that of Ohio where there are no rankings for the last half of the system plan because the parties involved decided that further investigation was unnecessary. Consequently, an additive rank can be distorted and therefore has no meaning.

TABLE 2.10 HELIPORT SYSTEM PLAN ANALYSIS FORM

STATE/LOCAL

PLANNING ELEMENT

INTRODUCTION

Planning Region

Purpose

Goals and Objectives

History/Development of Helicopter

Capability of Helicopter/
Competing Modes

INVENTORY

Data Sources

Active Helicopters

Survey Design

Helicopter Activity

Existing Heliport
Facilities

Services Available

Other Aviation Plans (if any)

Socio-economic

DESCRIPTION OF EXISTING SYSTEM/DEMAND

Role of Airports and Heliports

Operational Characteristics

Demand Analysis

Benefit to Community

PLANNING ELEMENT	STATE/LOCAL
FORECAST	
Methodologies	
Data Sources	
Forecast Period	
Based/Active Helicopters	
Operations	
Hours Flown	
Heliports (Growth in Operations)	
REGULATORY REVIEW	
Federal	
State	
Local	
HELIPORT PLANNING CRITERIA	
FAA Heliport Design	
Compatible Land Use	
AIRSPACE	
Types of Airspace	
Helicopter Operation within Existing System	
ENVIRONMENT	
Noise	
Safety	
Other Relevant Impacts	

STATE/LOCAL

PLANNING ELEMENT

RECOMMENDED SYSTEM PLAN/FACILITY REQUIREMENTS

Site Selection Process

Recommended Facilities

System Integration

Implementation

Benefits to Community
of New System

GENERAL

Overall Organization

Tables

Graphics

Rank 4 - complete. (All the components have been presented in a well organized manner and are used to further the development of the system plan to the fullest extent possible, could be used as a standard.)

Rank 3 - adequate. (The section component meets all the basic criteria but might have been extrapolated to a greater extent.)

Rank 2 - incomplete. (The subject component might have been touched on but criterion was lacking or inaccurate.)

Rank 1 - not included. (This element was not included in the plan.)

3.0 STATE SYSTEM PLAN EVALUATION

3.1 PURPOSE

The purpose of this report is to increase the effectiveness of future heliport planning efforts by assuring improved credibility and accuracy through the standardization of planning concepts. This section evaluates four existing state heliport system plans as to how well they satisfied the previously identified planning concepts criteria for organization and overall usefulness in heliport demand and location analysis (Table 3.1). The four plans evaluated are from Michigan, New Jersey, Louisiana, and Ohio. At the time of writing, while other state heliport system plans are in progress, only three, Michigan, New Jersey, Louisiana, have been completed as independent plans. Ohio, written as part of the Ohio State Aviation Plan Update, is still only in draft form. Although not as detailed as an independent plan would be, it is an overview of the helicopter activity of an entire state and was deemed valid for this purpose.

Additionally, the Ohio system plan is significant, because it reached a different conclusion from the others. The Ohio plan concluded that "there is little need for new public use heliports in Ohio..." This is a valid conclusion, based on an analysis of the statewide situation. If the area is able to provide adequate facilities to meet demand and if there is a system in place to assure continuation of the process, any further effort would be superfluous. As such, Ohio is very useful to this report because it shows the range of possibilities that the heliport system plans can have. As a consequence, Ohio was not rated under the "Recommended System Plan/Facility Requirements" element.

For reference, the planning concepts are organized and evaluated in the format suggested by the previous sections of this report. However, it is recognized that the existing system plans do not necessarily follow the format as presented here, and that sometimes concepts are presented within the context of the plan without formal labeling. Consequently, although overall organization and logical sequence are important criteria, the components of each standard planning element are analyzed without regard for their sequence of appearance.

3.2 ORGANIZATION

This section is organized into two parts. The first part is the completed evaluation form ranking each of the four state system plans. The next part is a discussion of the overall strengths and weaknesses of each of the system plans.

TABLE 3.1 HELIPORT SYSTEM PLAN ANALYSIS RANKING*

PLANNING ELEMENT	STATE MI	NJ	LA	OH
INTRODUCTION				
Planning Region	2	2	3	3
Purpose	4	4	3	3
Goals and Objectives	4	4	3	3
History/Development of Helicopter	2	2	3	1
Capability of Helicopter/ Competing Modes	1	1	4	1
INVENTORY				
Data Sources	3	3	3	3
Survey Design	3	3	3	2
Based/Active Helicopters	3	2	4	3
Helicopter Activity	2	2	2	2
Existing Heliport Facilities	4	3	2	2
Other Aviation Plans (if any)	N/A	N/A	3	N/A
Socio-economic	3	3	3	N/A
DESCRIPTION OF EXISTING SYSTEM/DEMAND				
Role of Airports and Heliports	3	3	3	3
Operational Characteristics	2	2	3	3
Demand Analysis	3	3	3	3
Benefits to Community	1	1	4	1

* See page 50 for an explanation of the ranking numerics

PLANNING ELEMENT	STATE MI	NJ	LA	OH
FORECAST				
Methodologies	3	2	3	3
Data Sources	4	2	4	3
Forecast Period	4	4	4	4
Based/Active Helicopters	4	2	3	3
Operations	3	2	3	3
Total Hours Flown	2	1	3	3
Heliports (Growth in Operations)	3	2	1	1
REGULATORY REVIEW				
Federal	4	4	3	3
State	4	4	3	3
Local	4	4	2	1
HELIPORT PLANNING CRITERIA				
FAA Heliport Design	4	4	4	4
Land Use	4	2	3	3
AIRSPACE				
Pertinent Airspace Classifications	2	N/A	4	2
Helicopter Operation within Existing System	4	N/A	4	
ENVIRONMENT				
Noise	4	4	2	2
Safety	4	4	1	2
Other Relevant Impacts	3	2	3	1

* See page 50 for an explanation of the ranking numerics.

PLANNING ELEMENT	STATE MI	NJ	LA	OH
RECOMMENDED SYSTEM PLAN/FACILITY REQUIREMENTS				
Site Selection Process	4	4	2	N/A
Recommended Facilities	4	4	3	N/A
System Integration	3	3	3	N/A
Implementation	4	4	2	N/A
Benefits to Community of New System	2	2	4	N/A
GENERAL				
Overall Organization	4	3	2	3
Tables	3	2	2	3
Graphics	2	2	4	3

Rank 4 - complete. (All the components have been presented in a well organized manner and are used to further the development of the system plan to the fullest extent possible, could be used as a standard.)

Rank 3 - adequate. (The section component meets all the basic criteria but might have been extrapolated to a greater extent.)

Rank 2 - incomplete. (The subject component might touch on but criterion is lacking or inaccurate.)

Rank 1 - not included. (This element was not included in the plan.)

N/A - Not Applicable

3.3 DISCUSSION OF RATINGS

3.3.1 Introduction

All the planning concepts identified as being pertinent to an introduction of a heliport system plan, except for "Capability of the Helicopter/Competing Modes of Transportation," are included in all the plans. Some concepts, however, were located in other sections. Only one plan deals with the significant competing modes.

Planning Region

While it may seem that a "State" plan would pertain only to the area within its boundaries, a transportation system plan, by its nature, should identify all areas that directly impact the region in question. Two of the plans adequately define the planning region and their "market areas" at the beginning. One mentions additional impact areas in a subsequent section, another does not mention it at all.

Purpose

All four plans include a statement of purpose in the introduction, however, in two of the plans, it is more clearly stated and more concisely organized.

Goals and Objectives

Goals and objectives are defined in all the plans. Two plans clearly state them in the first section. The other two, although the goals and objectives are generally stated well, put them in later sections after much of the data is presented. In one plan, the goals and objectives read more like recommendations.

Brief History/Development of Helicopter Technology and Operations

The history and development of the helicopter, although covered in all four plans, is inadequate in all four for different reasons. Two of the studies have too much history, and although interesting, go beyond the "need to know" in relation to the scope of the work. In the other two, the presentation is much more concise and is directly related to the current uses of the helicopter, but the data presented is either inaccurate and/or out of date.

Capability of Helicopter/Competing Modes

The overriding purpose of all heliport system plans is to integrate the increasing use of the helicopters in urban areas into the overall urban transportation network. Therefore, an understanding of the connection between helicopter use and current urban transportation modes must be made for government planners. One plan presents this topic very well, none of the other three present it at all.

3.3.2 Inventory

Data Sources

The availability of accurate data on helicopters, particularly historic operational data, is the bane of heliport system planners. As all four plans clearly state, few records are kept on helicopter activity as contrasted to the much more complete records traditionally kept for fixed-wing activity. All four plans do a very good job of developing resources for helicopter information under the circumstances, and are equally rated "adequate" not because of any lack in their presentation, but because of the limits of the available resources.

Based Helicopters/Active Helicopters

Determining the number of active helicopters in the planning region is one of the most critical parts of a heliport system plan. It is one of the concepts on which the analysis, the conclusions, and the recommendations of the plan are based. A distinction must be made between those helicopters registered, and those "active" in an area, because many helicopters are registered in one location, and active in another.

In one of the plans this distinction is not made, and there is no organized data base, just pieces of one. The terms "registered" and "based" (defined as those indicated by the survey) are used in a confusing manner. Furthermore, registered helicopters are only listed for certain aircraft manufacturers with no explanation as to why these are the only ones used. One plan does use the word "active" in relation to the data base, but the definition of "active" is not clearly made. The fourth plan makes a careful distinction between active and based helicopters.

Two of the plans only use a certain percentage of their defined "top number of helicopters" (less than 100%) for their data base. This method of showing only a certain "top" percentage of data is used consistently, however, and may be statistically significant, but no explanation of the value of this approach, or how the "top" percentage is determined, is given.

Accurate planning requires that the location, type, and operational characteristics of the active fleet be known. Only one plan makes a complete attempt to to do this. Unfortunately, it uses interpolated national data rather than planning region samples, which makes the data collection process in this section seem confusing. Two plans make adequate attempts. The fourth is sketchy, frequently interchanging the number of helicopters using heliports, the critical helicopter, and the number of "based" helicopters (indistinguishable between registered and active), so that achieving a clear understanding of the situation is practically hopeless.

Helicopter Activity

All four plans are incomplete in analyzing helicopter activity for various reasons. Two reports do not consider the number of hours flown at all. The number of hours flown is particularly important when examining primary use. Due to the nature of helicopter activity, the priority of uses can be badly skewed if the number of operations (by primary use) is not tempered with the number of hours flown (by primary use). Two of the plans do not consider operation by type or category of helicopter. Some of the plans do not consider trip length, trip time, percent of night operations, or average waiting time. One plan promises most of these items at the beginning of that section, but either does not present the information at all, or uses national statistics for some items. All of the plans cover number of operations, number of passengers, and origins and destinations, at varying levels of detail. Only one covers percentage of IFR activity.

Existing Heliport Facilities

Two of the plans cover the activity of existing heliports very well, including types of heliports and their locations. They could have, however, presented more detail on the services available. One discrepancy noted in each of these two plans is that the monthly activity numbers and annual activity numbers do not correlate, i.e., 12 times the monthly figure does not equal the annual figure. There may be a good reason for this, for instance, the monthly figures could represent "peak month" values, however, no possible explanation for this inconsistency is given. The third plan gives a quick profile of each heliport in question, and presents a list of all heliports in an appendix. It also includes forecasts of heliport activity. The fourth only provides a list of heliports in the appendix. Neither the third or the fourth plan gives current activity data.

Other Aviation Plans

In only one is there a current aviation plan with which the heliport system plan is coordinated. Another plan is, itself, a sub-part of an overall state aviation plan.

Socio-Economic

Socio-economic information is not always specifically addressed in the inventory section. Overall, however, it is well presented in a general sense, and appropriately used. One plan, as a draft, has not yet included socio-economic material.

3.3.3 Description of Existing System/Demand Analysis

Role of Airports and Heliports

All four plans recognize the interaction of airports and heliports in the overall helicopter operational system. However, within each plan, any analysis of the integration of ground systems is, for the most part, lacking.

Operational Characteristics

Two of the plans do not show a complete listing of helicopter operational characteristics. Too much attention is paid to the "largest helicopter", without any real explanation as to why this is important until later in the reports. There is no comprehensive breakdown of the types of helicopters by numbers of hours flown, operations, primary use, IFR activity, or night activity. All these concepts are important in the evaluation of the types of helicopter landing facilities required. The information that is provided is incomplete in that only a certain percentage of the helicopter fleet is represented. From the numbers that are presented, no indications of the type or the extent of demand for specified landing areas can be determined. In other words, there is no clear assessment of what percentage of the helicopter community needs public use heliports, private use heliports, or facilities on airports, etc. No IFR and night activity is presented, so there could not be an accurate determination of the services required at future facilities.

Two other plans present a more detailed description of typical helicopter activity in their respective areas. Even so, not all of the required planning concepts are present in these plans either.

Demand Analysis

All of the plans do an adequate job of describing the location of demand centers within the existing system, as far as they go. Two present percentages of activity at identified destinations, however, they show no operation numbers and are not 100% samples. One plan shows destinations by number of operations and by preferred public use heliport locations, but presents no potential operational figures. Latent demand is not discussed by any of the four plans.

Benefits to Community

Three of the plans do not present any evidence of how the current uses of helicopters in urban areas are directly or indirectly benefiting the community. Vague benefits are brought out in their respective historical sections, but nothing specific to the area under study. Direct benefits from helicopter utilization to communities are only alluded to in two of the plans. However, in one plan there is a section on economic impact analysis. This section includes the number of people employed by the helicopter industry, annual payroll, fleet replacement value, and an analysis of the "aviation industry economic multiplier effect", which describes the interactions (measures the indirect impacts) between the aviation industry and 39 broader sectors of the state's economy.

3.3.4 Forecasts

Methodologies

All of the four plans do an adequate job in describing the forecast methodologies, and all comment on the constraints to forecasting methods

created by the lack of historical operational data. However, forecasting is a primary weakness in all the existing heliport system plans. Although all four plans explain their methods adequately, no accurate method of forecasting helicopter numbers or activities has yet been developed. Planners are basing their methodologies on their airport experiences, yet the data base is not there for heliports. All four plans used regression analysis for one method, while explaining why this method is not accurate for helicopter forecasting. Then they chose an economic variable, often a different one for each plan, and tried to relate it to helicopter and activity growth. All the plans used some form of national statistics as a cross check or backup to their local projections. One plan discussed methodologies and socio-economic data but did not relate either to the bottom line numbers.

Data Sources

The primary data source for the forecasts are the helicopter owner/operator survey results. Due to the lack of any other central data collection source, survey results are the best resource available. All four plans used lengthy survey forms to collect source data, but the information was used in different ways. Different survey items were selected as important by different consultants covering the same planning concept. For example the number of hours flown was considered an important item in two of the plans and not mentioned in the other two. This shows the inconsistencies of the plans for comparison purposes.

Where methodologies and data are tied together, forecasting is adequate. But not all the required planning concepts are forecast in all the plans, which leaves the accuracy of the analysis of future operational characteristics in doubt. The biggest weakness is a lack of hours flown by primary use, which is completely missing in one report and just touched upon by another.

Forecast Period

All four plans use well defined planning periods of 5, 10 and 20 years. These planning periods are standard for aviation planning.

Based/Active Helicopters

Only one plan completely covers the forecasts for based active helicopters. Two plans do an adequate job and one does a poor job due to the data base not being carefully defined in the inventory. The biggest weakness is the lack of standardized, reliable methodologies and data collection.

Operations

Total numbers of helicopters and their primary uses are adequately covered in all the plans but one. Generally, the main weakness of this section is lack of any specific breakdown of forecast concepts, such as: IFR operations, night operation, average month, peak month, etc.

Hours Flown

The number of hours flown, which is the FAA's measure of primary use and helicopter activity, was only given adequate coverage in two of the plans. One uses only the total number of hours and the fourth does not mention hours flown at all. Again, a standardization of key items, especially one that is used in national data, like "hours flown", is needed to ensure reliable forecasting.

Heliports

The heliport system plans need to analyze the activity characteristics of existing heliports in the planning region in order to accurately define demand for future heliports. The data that define this demand must be identified, collected and studied with consistent methodologies. Growth in heliport operations is adequately handled in only one report. In another it is poorly handled because of the lack of individual breakdown of item by item forecasting. Forecasts of heliport operations are completely missing in the other two plans.

3.3.5 Regulatory Review

Federal

Two of the plans do an outstanding job in presenting the Federal regulations and programs available. A well organized, concise and straightforward format enhanced the presentation. The other two do a good job but they lack the excellent organization found in the first two.

State

The same two plans also do an outstanding job in their overview of their respective state aviation and helicopter regulations and financial assistance programs. Again, the other two do a good job but lack concise organization.

Local

Finally, the same two plans do an outstanding job in the review of local regulations, especially for a statewide project. Particularly impressive is the survey of local government regulations and attitudes regarding helicopter operations and facilities. The results are clearly presented. One of the others only touches on local legislation and in the fourth any mention of local regulatory considerations is completely absent. Although the system plans evaluated in this section are state plans, some indication or general trends on local attitudes are important. These two items alone can be the deciding factors on whether a heliport is built or not. Heliport system plans need to provide such data.

3.3.6 Heliport Planning Criteria

FAA Advisory Circular - Heliport Design

All four plans present the FAA's heliport design criteria very well. All describe the material in both text and diagrams.

Land Use

One plan does an outstanding job covering land use compatibility with regard to the siting of heliports. They discuss the importance of land use compatibility with regard to heliports and clearly indicate areas where heliports can and cannot be built. Two do only an adequate job and one is incomplete.

3.3.7 Airspace

Pertinent Airspace Classifications

A general discussion of the types of airspace regulated by the FAA is not included in two of the reports; however, both discuss FAR Part 77 criteria. One report describes types of airspace in detail, while the other includes an airspace discussion in a separate volume that was not available for review.

Helicopter Operation within the Existing System

One report provides an excellent discussion of the types of airspace required for helicopter operation and relates all aspects to the area under study. Again, one report provides this information in a separate volume that was not available for review. Another incorporates current helicopter operations in its discussion on airspace.

3.3.8 Environment

Noise

Two of the plans present an excellent section on noise. They include an overview of noise, which is then related to urban areas and to heliport development. The other two plans present the noise topic poorly, but for different reasons. One only presents a small section on noise that is incomplete. The other is too detailed, presenting information that is not consistent with the scope of the plan.

Safety

Two of the reports present complete discussions on safety. These sections include helicopter safety statistics as well as a discussion of safety concerns as perceived by the public. Safety is not discussed at all in the third plan, and the last just presents a cursory discussion of helicopter safety on approach departure paths near powerlines.

Other Relevant Impacts

Two plans present too much detail regarding other environmental impacts, discussing each of the nineteen items called for in FAA Order 5050.4A, Airport Environmental Handbook, without relating them to the needs of the area under study. Another plan presents concise coverage of environmental assessment requirements and the steps required in the environmental assessment process, but does not relate them directly to heliport concerns. The last report considers only noise and safety and ignores other possible environmental impacts.

3.3.9 Recommended System Plan/Facility Requirements

In this section only three heliport system plans are reviewed, as the Ohio plan recommends that no further heliport development is necessary.

Site Selection Process

One report presents an excellent section on siting criteria. It outlines the site selection process step by step, including public participation, site screening methods, site evaluation, environmental concerns, etc. Siting criteria is presented in a separate section in the second plan and concentrates on the noise and safety aspects exclusively, while another section presents the model zoning ordinance. The third includes siting criteria but in a very generalized form, and specifically focuses on only one type of heliport. All information is very disorganized and, although detailed conceptually, is not specific to the planning region.

Recommended Facilities

All three of the reports make very specific recommendations for required facilities and two of these plan present this information in a very organized format. Types of facilities are developed from the heliport classification system in the FAA Advisory Circular current at the time of writing. Different types of heliports are recommended based on the expected level of operations at different locations in all of the reports. Although the primary focus is on public use heliports, other types of facilities, such as private heliports and airport landing areas, are considered.

System Integration

All three heliport system plans present an adequate plan of system integration as far as they go. However, one important consideration is not discussed in any plan. This is the integration of helicopter transportation with various appropriate ground transportation.

Implementation

Two of the plans have separate sections on the implementation of the recommended system plans. These sections use a specific time frame and lay out the recommended steps for implementation. Included in the plan are the regulatory aspects, the policy aspects, the specific role of the state aeronautics department, and the priority of heliport plans. The third plan recommends a planning approach but does not define a specific time frame or delineate priorities except for hospital heliports. However, the same plan does emphasize the need for continual updating of the heliport system plan, which is a major point that all the plans should emphasize. Two of the plans outline the estimated cost for the implementation for the entire system plan, both in terms of planning and construction. They also break down the estimated costs of different types of heliports. Sources of funding are also discussed. The third plan does not include system plan costs.

Benefits to the Community of the New System

Direct benefits of helicopter utilization in communities are only alluded to in two of the plans. However, as stated earlier, one report has a section on economic impact analysis. Unfortunately it does not correlate the recommended system plan with these indicators.

Organization

Overall organization is reasonable. All four plans are more or less based on the airport system/master plan format. One plan is extremely well organized and written in a clear, logical, and concise manner, in spite of the fact that there appears to be a lack of understanding of several key points in heliport planning, e.g., why helicopter use and heliport use are different. Another plan has a better grasp of the heliport planning issues, but the rambling style of its writing considerably diminishes its overall impact.

Tables

In two of the plans, the tables used to graphically depict information are adequate, and in two they are poor. Some of the tables are unclearly numbered and/or titled while others within the same plan are fine. In some cases it was uncertain whether the information in the table is based on local or national figures. The acknowledgement or references for data sources is also lacking on most of the tables. None of the four plans has consistently excellent tables.

Figures

One plan has excellent figures that were well presented, neat and easily understood. Another plan has adequate figures, but not outstanding. The other two have poor figures. These are unclear, scrawly, unreadable at times, and are presented in a manner that is difficult to comprehend.

Conclusions of the evaluations of all eight heliport system plans are found in Chapter 6 of this report. The next section examines the four metropolitan system plans in the same format as the state plans presented in this section.

4.0 METROPOLITAN SYSTEM PLAN EVALUATION

4.1 PURPOSE

This section evaluates four existing metropolitan heliport system plans. As in the previous section, these plans are evaluated in terms of how well they satisfy the previously identified planning concepts in terms of organization and overall value in heliport demand and location analysis (Table 4.1). The basic planning concepts are the same, but closer attention is paid to relating the data collection and analysis to the area under study. For instance, a more detailed study of the airspace, the land use, the site selection, analyses and the local government's role in helicopter issues, would be required.

Again, for reference, the planning concepts are organized and evaluated in the format suggested by this report. However, it is recognized that the existing system plans do not necessarily follow the format as presented here and that sometimes concepts are presented within the context of the plan without formal labeling. Consequently, although overall organization and logical sequence are important criteria, the components of the standard planning concepts in the existing system plans are analyzed without regard to the sequence in which they appear.

This section evaluates the methodologies used in four existing metropolitan heliport system plans; Pittsburgh, Pennsylvania; Phoenix, Arizona; Houston, Texas; and Washington, D.C.

4.2 ORGANIZATION

This section is organized into two parts. The first part is the completed evaluation form ranking the four metropolitan system plans. The second part is a discussion of the overall strengths and weaknesses of the system plans.

4.3 DISCUSSION OF RATINGS

4.3.1 Introduction

The planning concepts identified by this report as necessary requirements for an introduction to a heliport system plan are, for the most part, included, but not necessarily in the introduction. An evaluation of how the system plan handled the individual concepts is presented below.

Planning Region

It is important to identify the geographic region under study including all areas that may impact it. A major weakness identified in this evaluation of the plans is their failure to define the area under study. Accurate data collection and site selection analysis is not possible unless the planner knows the area that is significant. One plan talks about the metropolitan area under study, and provides a location map of the city, but the discussion that follows is about "helicopters"

TABLE 4.1 EVALUATION OF LOCAL SYSTEM RANKING*

PLANNING ELEMENT	LOCAL PITT	PHX	HOU	DC
INTRODUCTION				
Planning Region	3	4	3	3
Purpose	4	3	3	3
Goals and Objectives	3	1	4	3
History/Development of Helicopter	2	2	3	1
Capability of Helicopter/ Competing Modes	1	4	4	2
INVENTORY				
Data Sources	3	3	3	2
Survey Design	2	3	3	2
Based Helicopters/Active Helicopters	2	4	3	2
Helicopter Activity	2	3	3	2
Existing Heliport Facilities/Activity	4	2	3	2
Other Aviation Plans (if any)	4	3	3	1
Socio-economic	3	4	3	1
DESCRIPTION OF EXISTING SYSTEM/DEMAND				
Role of Airports/Heliports	2	3	4	3
Operational Characteristics	2	3	3	2
Demand Analysis	4	3	3	3
Benefits to Community	1	1	2	1
FORECAST				
Methodologies	3	3	3	3
Data Sources	3	3	3	2
Forecast Period	4	4	4	4
Based Active Helicopters	2	3	3	2

* See page 64 for an explanation of the ranking numerics.

PLANNING ELEMENT	LOCAL			
	PITT	PHX	HOU	DC
Operations	2	3	3	3
Total Hours Flown	1	3	3	1
Heliports	4	2	2	1
REGULATORY REVIEW				
Federal	2	3	3	2
State	2	3	1	N/A
Local	3	3	1	1
HELIPORT PLANNING CRITERIA				
FAA Heliport Design	4	4	4	4
Compatible Land Use	4	3	2	4
AIRSPACE				
Pertinent Airspace Classifications	3	4	3	4
Helicopter Operation within Existing System	3	4	2	2
ENVIRONMENT				
Noise	4	4	1	4
Safety	1	2	1	4
Other Relevant Impacts	4	2	2	4
RECOMMENDED SYSTEM PLAN/FACILITY REQUIREMENTS				
Site Selection Process	4	3	2	4
Recommended Facilities	4	4	4	4
System Integration	3	3	3	4
Implementation	4	3	2	3
Benefits to Community of New System	1	1	2	3

* See page 64 for an explanation of the ranking numerics.

PLANNING ELEMENT	LOCAL			
	PITT	PHX	HOU	DC
GENERAL				
Overall Organization	3	3	2	2
Tables	3	3	2	3
Graphics	4	2	3	4

Rank 4 - complete. (All the components have been presented in a well organized manner and are used to further the development of the system plan to the fullest extent possible, could be used as a standard.)

Rank 3 - adequate. (The section component meets all the basic criteria but might have been extrapolated to a greater extent.)

Rank 2 - incomplete. (The subject component might have been touched on but criteria was lacking or inaccurate.)

Rank 1 - not included. (This element was not included in the plan.)

N/A - Not Applicable.

in the "region" without defining the region. Further into the plan there is a discussion of a 40 mile radius but it is not clear if this is meant to be the same area as the "region" or not. Another uses a market area for inventory collection but does not define its boundaries. In another system plan, the market area is generally defined at the beginning, but it is a nebulous definition. However, in the site selection process the planning region is specifically defined. In another, the planning region is very well defined, both in terms of the sponsoring agency and the market area. It also provides an explanation on how the market area boundaries are determined.

Purpose

The purpose explains what aspects or impacts of helicopter operation are to be explored within the scope of the plan. Three plans stated the purpose well. However, one presentation is too short, and does not explain exactly what needs to be done, or why.

Goals and Objectives

Goals and objectives are the framework of the purpose. They should list the individual requirements and the steps necessary to accomplish the purpose. Goals and objectives are not specifically identified in three of the four plans, but all of these three do include discussions in their introductions that can be considered as statements of goals and objectives. The main weakness is that unless the reader is looking specifically for goals and objectives he would not find them.

History and Development

A discussion of the history and development of the helicopter is necessary in order to understand its current urban role. The discussion of this ranges from overdone to none. One plan presents much more than is necessary in relation to the scope. Another plan has only one sentence relating the present use of the helicopter to the Vietnam War. The last has no discussion on this topic.

Capability of Helicopter/Competing Modes

It is difficult to make recommendations on heliport use and location unless the planner knows the capabilities of the helicopter and the modes of urban transportation with which the helicopter competes. Two of the plans provide very little information regarding the capability of the helicopter in relation to its urban uses and its competing modes of transportation. The other two develop this discussion and include figures of comparative modes. One of the plans provides a local map comparing distances between the region's airports and urban center.

4.3.2 Inventory

Data Sources

Three of the four plans provided defined data sources, one at the beginning and two throughout the text. The other discussed their methodologies without providing any of their sources. (Specific sources are presented in Chapter 5.)

Survey Design

Surveys are particularly important to data collection. They are often the only source of data on local helicopter and heliport activity. Although the information sought through the surveys is primarily inventory data, it must be understood that these are the data upon which all subsequent conclusions and analysis of demand are based.

Two of the local plans showed considerable weakness in this phase of their data collection. One plan used a survey from another report on the regional area and does not do a new survey. Another does a telephone survey of helicopters in a different major metropolitan area to determine the characteristics of helicopter airline operation involving a public use heliport. It also uses another survey on helicopters in the planning region completed in 1979. This survey was four years old at the start of the new plan. Additionally, many changes had occurred in the helicopter industry since 1979 that would have affected the value of 1979 data.

The other two plans use new surveys designed for the regions under study and include a summary of the results in the text and the complete results and survey form in the appendices. These surveys ask for detailed data. The only criticism that can be made is that they are too long, and the longer the form the less people will take the time to fill

it out and return it, whereas with a shorter form more people may return it. Unfortunately a tradeoff must often be made between collecting detailed data from a small group of helicopter owner/operators who are willing to fill out a long survey, and collecting less data from a broader group of respondents.

Based/Active Helicopters

An accurate determination of the number and operational characteristics of those helicopters that are significant to the planning region must be made. This is a major weakness in the data collection process of many heliport system plans. There is little understanding of the differences of the terms "based", "active" and "registered". Sometimes these terms are used interchangeably. The metropolitan heliport system plans exhibited a range of acceptability in this phase of data collection.

In one plan no information is given on registered helicopters. The number of "active" helicopters is derived from the Aerospace Industries Association (AIA) Directory. In another system plan, based/active helicopter information is taken from a regional report derived in another plan. Additionally, different numbers are used as the based number in different places in the system plan. Furthermore, "based helicopters" are defined as "stored" and no mention is made of any active fleet. At one place in the plan based helicopters are allocated to heliports, and in another, to airports. In a third plan, information on registered helicopters is adequate but sketchy, and too much irrelevant information is provided on national helicopter statistics. In the other plan, active helicopters are distinguished from based helicopters, and the survey data is used to provide a good profile on the characteristics of the active fleet. The distinction between helicopters registered in the planning region and those active in the planning region is clearly made. Differences between registration data from both Federal and state sources are reconciled. (Some states do not register helicopters so this is not always possible.)

Helicopter Activity

It is necessary to know activity characteristics of the local helicopter fleet in order to accurately determine the location, type and viability of a potential public use heliport. The presentation of these characteristics varied among the plans.

The only helicopter activity shown in one plan is in a summary of forecasts from a previous report. In another, helicopter activity is derived as percentage share of commuter automobile traffic between the downtown, the suburbs and the three area airports. The other two plans provide active helicopter information from their surveys. One provides a breakdown of the numbers and percentages of helicopters in the planning region defined by type and location, military activity is identified, and origins and destinations of the active fleet are identified in a later section.

Existing Heliport Facilities/Activity

An understanding of the types and activity of the existing heliports in the planning region is important to accurate system planning. The area heliports are a critical part of the transportation infrastructure under evaluation. The heliport system plans do not show consistent methods of data collection or presentation of heliport data.

One plan provided data on the existing heliport facilities and their activity. This is done very well using location maps and tables with breakdowns presenting detailed information. Information is also provided on annual operations and heliport use. In another, an excellent profile of types of heliports and facilities is given but no location or operation data are provided. In one plan, heliport facilities are only described in a general way, and location of sites is poorly identified. However, the significance of airports in the area is described. The fourth provided no information on area heliports, only on activity reported at area airports, and no information of existing heliport facilities.

Other Aviation Plans

Although heliport system plans can be prepared as separate documents, they cannot ignore the planning analysis in studies of the other aspects of aviation. In general, where other aviation plans are available they are integrated into the system plans. Only one plan mentioned the significance of the National Plan of Integrated Airport Systems (NPIAS) to the system under study.

Socio-Economic

Although specific socio-economic indicators have been identified as significant to the evaluation of fixed-wing activity, no such relationship has been defined for helicopter operations. Without specific guidelines as to its use, socio-economic data has no defined relationship to heliports. Each plan independently determines what it considers important for its purpose. Therefore, there is a haphazard data collection effort in this area.

Two of the system plans focused on the characteristics of the area, while one included the planning structure and planning methods of the city in question. It also explains the different types of existing transportation, population and growth characteristics, employment, and land use. The other two do not present any focused discussion on socio-economic factors but some concepts are incorporated into the material in other sections.

4.3.3 Description of Existing Systems

Role of Airports/Heliports

Although the transportation modes that compete with helicopters are mostly ground systems, and most areas have some private use heliports for destinations, the facilities used by helicopters for services and home bases are primarily airports. As a consequence, the identification and

significance of the planning region's airports and private use heliports are vital in analyzing the transportation system. Three of the plans discussed airports and heliports as part of the area's transportation network, while one did not directly connect airports and heliports as part of the same system.

Operational Characteristics

In defining a working transportation system, it is necessary to identify the operational characteristics of the transportation mode under study. However a primary weakness of many of the heliport system plans is a lack of working knowledge of the operational characteristics of the helicopters in the planning region. Only two plans provide much of a discussion on the operational characteristics of the local helicopter fleet. Very little is mentioned on this item in the other two system plans.

Demand Analysis

The analysis of demand for heliports is the underlying purpose of all the system plans. For the most part, the system plans handle this element very well. One plan provides information taken from the surveys regarding the preferred location of a public use heliport in the planning region. The areas for potential heliports are described very well in terms of the number of expected operations, type of area that created the demand, and the surrounding land use. However, origins are not described other than "from the region". Two others provided a good description of the whole operational system. One of these, however, does not present potential operational numbers. The last uses percentages of the expected capture of helicopter passengers from present transportation modes, which is a different approach than all the other plans and could provide planning with a better method of estimating demand. However, it also used data provided by an out of date (1979) survey that diminishes the plan's credibility. The demand analysis is quite comprehensive, but the base data may have been unreliable.

Benefits to Community

Defining the public benefits to the public of helicopter transportation in urban areas may be vital in providing adequate heliport facilities. The structure of heliport system plans is based on traditional airport system and master plan formats, which do not include a section on the benefits of aviation to the community. However, heliport system plans must stress this aspect as much as possible. None of the four system plans provided any specific data on direct or indirect benefits to the community. Any mention of benefits is only spoken of in generalized terms. One plan did specify the time saving aspect of helicopter transportation in estimating the potential passenger capture possible from other modes of transportation.

4.3.4 Forecasts

Methodologies

Forecasting future activity is one of the most important aspects of the heliport system plan, and one of the most poorly developed. The methods used for traditional aviation planning are not accurate for heliports, and no new methodologies have been developed that would apply directly to heliport system plans. Because of this, heliport system plans either tend to collect any and all information possible, or very little. One plan uses the basic methodologies taken from the previous regional plan and applies these methodologies very well in determining future demand for a downtown heliport. Data from the inventory are incorporated into the forecasts. Another plan forecasts future activity based on an identified share of the numbers of automobile users that would use a helicopter for the commute if it were available. This is an interesting approach, which could be useful, but the plan does not use or forecast helicopter numbers or activity data. The other two plans attempt to explain their forecast methodologies but the explanation is convoluted and unclear. However, the data base came from the inventory, and helicopter activity is forecast in detail by total numbers, type, primary use, etc.

Data Sources

All four of the plans describe their data sources for the forecasts in a clear manner. Three use the information that is collected in the inventory sections, while the other does not have specified source but provides this data as necessary in the text.

Forecast Period

All four plans define the time limits of their forecast periods and the reasons for using those limits as well as the reliability of the forecast within each planning period. The planning periods used are 5, 10 and 20 years, the standard periods for aviation planning.

Active Helicopters

One of the problems with the forecasting phase of the heliport system plans is the inadequacy of the inventory phase. Data collected in gross numbers in the inventory are forecasted in gross numbers. Fine tuning of detail that would provide an accurate picture of future activity is not possible. In forecasting helicopter activity, two of the plans reflect the problems with their data collection process. There is no breakdown of types or numbers of helicopters, although one does forecast fleet mix at the three top sites selected. One of the plans does not distinguish between registered or active helicopters and collects the numbers of helicopters in the planning region from inprecise sources. The other two broke down the forecasted helicopter activity by type and primary use.

Operations

Estimated future operations are critical in forecasting demand. One plan does not adequately discuss helicopter operations. The discussion of operational characteristics are limited to heliport activity. In two plans, operations are forecast by total number, primary use, fleet mix, night operations, possible IFR operations, and average numbers of passengers. They do not calculate average month and peak month. A fourth plan forecasts the total operations, the average number of passengers, and the annual and daily operations to a possible public use heliport. Primary use is only forecast under three categories, commercial service, public service and corporate/private.

Hours Flown

The number of hours flown is important in understanding helicopter operational characteristics. The nature of helicopter use allows for frequent operations over a short period of time. Consequently, to get an accurate reading of helicopter utilization in an area, the number of operations must be tempered with the number of hours flown. Forecasting hours flown, therefore, modifies the forecasted number of operations for an accurate indication of use. Furthermore, hours flown is the method the FAA uses in its statistical measure of helicopter use, therefore hours flown can be used for more accurate historical analysis of helicopter activity growth. Two of the plans did not calculate the forecasted number of hours flown, although one does forecast peak hour operations, commercial passenger enplanements, average day of the peak month enplaned passengers and peak hour commercial enplaned passengers, for the top three selected sites. In the other two, the total number of hours flown, primary use, fleet mix, night and IFR operations, are forecasted. Average month and peak month values are not forecasted.

Heliports

Forecasting heliport operations is an important step in estimating demand for, and viability of, any recommended heliport facility. In two of the four plans, potential heliport operations are forecasted for the demand centers - the possible locations of a public use heliport. Another plan handles the heliport operational forecast very well, with breakdowns of annual, peak month, and peak hour operation. However, only a brief mention is made of IFR capabilities and no night operations are mentioned. The fourth plan did not have any data on existing heliports.

4.3.5 Regulatory Review

Understanding the regulatory climate of the planning region, as well as the state and Federal laws and guidelines, is important in determining potential sites for heliports. These regulations cover everything from the necessary dimensions of a heliport to local attitudes towards helicopters, and must be thoroughly researched in describing the workings of the system.

Federal

Two of the plans focused only on Federal regulations without mentioning any other aspects of the Federal Government's programs or controls. In the other two, Federal regulations regarding heliports and imaginary airspace surfaces are discussed throughout the plan, but additional regulations are not.

State

In only one plan is the state's role well defined. Another only provides a summary of state regulations and does not describe the full involvement of the state in heliport development. Out of the other two, one did not discuss state regulations. No state regulations would apply to the other.

Local

Two of the plans provide very little data about local regulations and codes. Another touched on two main issues that are important within the sponsoring region, but did not touch on issues regarding noise, safety or political climate. Only in one plan are local attitudes, zoning regulations and permits discussed.

4.3.6 Heliport Planning Criteria

FAA Advisory Circular - Heliport Design

All four of the state system plans provided excellent coverage of the heliport design criteria. They are thoroughly discussed and reviewed.

Compatible Land Use

The growing concern of the public about helicopters operating in their neighborhoods increases the need to site heliports in areas of compatible land uses. This means the planner must know what compatible land uses are, and where they are, in the planning area. The aspects of compatible land use in siting potential heliports is handled very well in three of the plans, but in different ways. Two explain it throughout as part of the siting criteria, the other discussed it thoroughly at each of the potential sites that they had previously selected. The fourth plan does not present anything specific, although the model zoning ordinance on height limitation is referenced.

4.3.7 Airspace

As specified by Federal law, and by their operational capabilities, helicopters are able to operate in uncontrolled airspace at low altitudes. This is one of the reasons they are used in urban areas. As the public becomes concerned (and annoyed) with this type of operation, it becomes even more important for both the urban and aviation planner to have a working knowledge of the types of airspace that concern helicopter operations. A knowledge of airspace is also necessary for the siting of approach/departure tracks and the analysis of the heliport operational system.

Types of Airspace

One plan provides a general discussion of airspace, but not much data relating directly to the planning region. Conversely, one plan had no general discussion, but the impact of helicopter operations on the planning region's airspace is discussed well for each potential site. The discussion includes routes, accessibility, and regional patterns. Another plan has a separate section on airspace that describes general airspace categories found in the planning region and how helicopters are now operating in the area. It also discusses the effect the proposed heliport would have. In the last, existing airspace types and limitations are explained adequately, however, a little more background on airspace would have been appropriate.

Helicopter Operation Within Existing System

One system plan presented operational patterns and limitations within the framework of the existing system. One gave a detailed description of helicopter operation within the existing system identifying present operational procedures, letters of agreement, and possible operational procedures if the proposed public heliport is built. In a third, helicopter operational patterns are described, but not in relation to the airspace structure in the planning region. In the fourth, most of the discussion of helicopter operations is on the expected operational characteristics of the potential heliport sites previously selected.

4.3.8 Environment

Projects developed with Federal money must address the possible environmental impacts associated with the heliports. Although there are 19 environmental impacts itemized in FAA Order 5050.4A, Airport Environmental Handbook, the primary impacts associated with heliports are noise and safety. Other impacts should be evaluated as necessary.

Noise

Three of the four plans do a very good job discussing noise. In one, noise is presented in the context of the site selection, including noise contours and a discussion on noise measurement. Another presents a separate section on noise, providing current noise measuring methodologies, as well as depicting noise contours for all the potential demand center sites. A third provides an excellent section on noise, explaining theory, methodologies and it also includes noise contours for each potential site. The other plan did not include any noise analysis.

Safety

A major weakness of three of the plans is that the safety element of heliport siting is either not included, or not well discussed. Safety as a community concern is not discussed. Safety is included primarily in discussions on approach and departure paths. One plan does include a section on safety that is very well done. It includes fire protection, implications of overflight, and accident potential. Approach and

departure path location, obstructions avoidance, all-weather potential, passenger ingress and egress problems at both ground level and rooftop locations, as well as security screening, are also present.

Other Relevant Impacts

The four system plans vary on this element. In one, only a brief description is provided on the process of an Environmental Assessment (EA)/Environmental Impact Study (EIS), but it does not relate these to the planning region. One does not discuss any of the topics except noise and safety with any depth. Another discusses one other concept significant to its area. One plan, however, presents all the factors of a basic environmental assessment in relation to the area under study. This is appropriate for a site selection process regarding a master plan of a particular site.

4.3.9 Recommended System Plan

Site Selection Process

One of the major strengths of the existing heliport system plans is that, although working independently, most developed excellent site selection processes. These are described in the context of the evaluation below.

Two of the plans develop site selection processes that include two matrices, the first screening all potential sites and the second evaluating those selected in the first. The theory and selection criteria is well thought out and well executed. One plan is impressive in that it provides maps and layout plans for each site. The other, although good, is not as thorough. Another plan also has a thorough site selection process that assesses all potential sites, screening down to the most viable. Site selection criteria are well chosen and applied. The last does not do as well. It develops recommendations for several sites, however, there is no explanation on why these sites are selected, not even any distance requirements.

Recommended Facilities

The recommended facilities are well planned in the demand capacity analyses in all four plans. Facilities selected are evaluated in terms of the requirements of the area under study.

System Integration

The understanding of how heliports fit into the aspects of the present transportation system is a particularly important aspect for these plans to consider. All four metropolitan heliport system plans covered system integration adequately. One of the system plans covers almost every aspect of the suggested standard planning concepts, including possible effects of the development and civil use of the tiltrotor. However, a little more discussion on the integration with the existing transportation network in regard to the existing heliports and

airports is needed. Little is said on helicopter transportation as part of an entire system. Another plan considers all of the recommended requirements including airports and ground transportation, but does not include possible impacts of new technology. A third includes well defined integration with the existing transportation system, but it does not discuss specific airspace or environmental impacts or impacts of new technology. The last includes airspace, environment, air and existing ground transportation into their discussion on system integration.

Implementation

One plan does a very good job on implementation of the public use heliport, including staging of development, financial feasibility, and the role of the different governmental entities. Another provides the same information, but is not as well organized or as complete. In another, the implementation process is only outlined, and the discussion of government participation does not define specific roles beyond that of the Federal level. One plan did not present any implementation schedule or discussion, but does provide community involvement procedures and costs for various aspects of heliport development for specific sites.

Benefits to Community

Benefits to the community are discussed only in general terms in the introduction two of the plans. In another, the benefit to the community is discussed only in terms of transportation. One plan did discuss direct benefits to the community determined in time/cost savings of helicopter travel, however, the discussion is not given in a specific section but incorporated throughout in sections with other titles.

5.0 SYSTEM PLAN RESOURCE REVIEW

5.1 BACKGROUND

The existing heliport system plans were, in effect, a pioneering effort in aviation planning. Two of these, New Jersey and Louisiana, were the first such plans ever attempted. Consequently, they were also the first to seek out resource material on helicopter operations and heliport development. Until recently, statistics were not kept on helicopter operations. Even today only a few air traffic facilities maintain discrete helicopter operational data. The only historical data currently available has been the records on registered helicopters kept by the Federal Aviation Administration. The planners involved in the system plans assembled what material they could find. Some of it is very useful and accurate, while some of it has been found to be less valuable as helicopter/heliport source data has become more sophisticated and plentiful. Planner surveys are often the only source of local activity. This section evaluates the resource material that has been used, in an attempt to sort out the better data sources to promote more accurate demand analysis.

The resource material used by the existing system plans, and some additional sources, have been divided into seven categories so that like items can be evaluated in an orderly manner and, so that those looking for references in specific areas can find them quickly. The categories are:

- Federal Guidelines/Regulations
- Helicopter Operational Characteristics Data
- Directories
- Transportation Theory
- Forecasts and Statistics
- Socio-Economic Data
- State and Local Aviation Data

Since it is impractical to list and evaluate all sources of state and local data, this section suggests the type of material that would be valuable for local analyses and where it can be obtained. This discussion is presented in Section 5.3.6.

This section is divided into three parts. The first is the list of all resource material used by the system plans categorized by topic. The second part is an evaluation of these resource materials. The final part is an evaluation of the surveys that the system plans used to collect local helicopter and heliport activity data. An bibliography can be found in the third document of this series report Heliport System Planning Guidelines (DOT/FAA/PM-87/33), (DOT/FAA/PM-88-3).

5.2 LIST OF RESOURCES

Table 5.1 presents a list of system plan source material categorized by topic. Several of the resources have been used by the majority, if not all, of the system plans. These sources are indicated by an asterisk. These resources can be considered the minimum needed to initiate any heliport system plan activity.

TABLE 5.1 RESOURCE MATERIAL USED IN EXISTING SYSTEM PLANS

FEDERAL GUIDELINES/REGULATIONS

1. FAA, Airworthiness Standards: Normal Category Rotorcraft, Federal Aviation Regulation Part 27.

2. FAA, Airworthiness Standards: Transport Category Rotorcraft, Federal Aviation Regulation Part 29.

3. 14 CFR, Part 73 - Special Use Airspace, Code of Federal Regulations, January 1983.

4.* FAA, Objects Affecting Navigable Airspace, Federal Aviation Regulation Part 77.

5. FAA, General Operating and Flight Rules, Federal Aviation Regulation Part 91.

6. FAA, Air Taxi Operators and Commercial Operators of Small Aircraft, Federal Aviation Regulation Part 135.

7. FAA, Certification and Operations-Certified Air Carriers, Federal Aviation Regulation Part 139.

9. FAA, United States Standard for Terminal Instrument Procedures (TERPS), FAA Order 8260.3B, 1976, Third Edition, Changes 1-3.

10.* FAA, Policies and Procedures for Considering Environmental Impacts, Order 1050.1D, 12/21/83.

11. FAA Order 5050.4A, Airport Environmental Handbook.

12.*+ FAA, Heliport Design Guide, AC 150/5390-1B, 1977.

13. FAA, Utility Airports - Air Access to National Transportation, Advisory Circular 150/5300-4B.

14. FAA, Airport Design Standards - Transport Airports, Advisory Circular 150/5300-12, 2/28/83.

15. FAA, Noise Assessment Guidelines for New Heliports, Advisory Circular 150/5020-2. 12/9/83.

16.* A Model Zoning Ordinance to Limit Height of Objects Around Airports, Advisory Circular 150/5190-4 CHG 1.

* Used by the majority, or all, of the system plans.

\+ All the system plans analyzed in this report used this edition of the FAA Heliport Design Guide, AC 150/5390-1B, 1977. In January, 1988, the new edition FAA AC 150/5390-2 Heliport Design, was released.

TABLE 5.1 RESOURCE MATERIAL USED IN EXISTING SYSTEM PLANS (CONTINUED)

17. Introduction to the Airport Improvement Program, FAA Office of Airport Planning and Programming, November 1983.

18.*FAA, Rotorcraft Master Plan, FAA-P-8100.1, AWS-1 0989, 1987.

19. Air Quality Procedures for Civilian Airports and Air Forces Bases, FAA Report FAA-EE-82-21, November, 1982.

20. NFPA 403; Aircraft Rescue and Fire Fighting Services at Airports, 1978.

21. NFPA 418; Roof Top Heliport Construction and Protection, 1979.

HELICOPTER OPERATIONAL CHARACTERISTIC DATA

1.* FAA, Basic Helicopter Handbook, 1978, AC61-13B.

2. Dan Manningham, Understanding Helicopters, Business and Commercial Aviation, May 1982, pp. 59-74.

3. Up Over and Below, AIA Brochure, Aerospace Industries Association, January 1973.

4. Brigadier General H. Frank Gregory, The Helicopter, A.S. Barnes & Co., Inc., Cranbury, N.J., 1976, p. 19.

5. Steve Wartenberg, Solving the Vertical Flight Puzzle: The Early History of the Helicopter, Vertical Flight, edited by Walter J. Boyne & Donald S. Lopez, Smithsonian Institution Press, Washington, D.C., 1984.

6.* Fly Neighborly Guide, HAI, Heliports and Airways Committee, Sept. 1983, ISSN 0739-8581.

DIRECTORIES

1.* Aerospace Industries Association of America, Directory of Helicopter Operators in the United States, Canada, Mexico an Puerto Rico, 1985-1986, Washington, D.C., (no future editions are to be published from this source).

2. Aerospace Industries of America, 1984 AIA Directory of Heliports, 1984, Washington, D.C., (no future editions are to be published from this source).

3.* Helicopter Association International (HAI), Helicopter Annual, published annually.

4. "Rotor and Wing International", 1988 Buyer's Guide, Helicopter Specifications.

* Used by the majority, or all, of the system plans.

TABLE 5.1 RESOURCE MATERIAL USED IN EXISTING SYSTEM PLANS (CONTINUED)

TRANSPORTATION THEORY

1.* NASA, Community Rotorcraft Transportation Benefits and Opportunities, NASA CR166266, 1981.

2. Gilbert, Glen A., Helicopter Northeast Corridor Operational Test Support, June 1980, FAA-RD-80-80.

3.* Planning for Rotorcraft and Commuter Aviation, NASA/Ames Research Center Draft Report, July 1981.

4. Wiley, John R., Airport Administration, ENO Foundation of Transportation, 1981.

5. SAE Technical Paper Series, Helicopter - A Solution to Urban Commercial Transportation Needs, by Stanley R. Spector; SAE, Inc., 400 Commonwealth Drive, Warrendale, PA.

6 * PACER Systems, Inc., Development of a Heliport Classification Method and an Analysis of Heliport Real Estate and Airspace Requirements, 1981, DOT/FAA/RD-81-35.

7. PACER Systems, Inc., Study of Helicopter Performance and Terminal Instrument Procedures, 1980, FAA-RD-80-58.

8. PACER Systems, Inc., Study of Heliport Airspace and Real Estate Requirements, FAA-RD-80-107, 1980.

FORECASTS & STATISTICS

1. FAA, FAA Statistical Handbook of Aviation, Calendar Year, (various, published annually).

2. FAA, The General Aviation Dynamic Model, Volume II, Technical Report, 1979, Report No. FAA-AVP-79-8, Table 4, p. 18.

3.* FAA Aviation Forecasts, U.S. Department of Transportation, FAA-APO-88-1, February 1988.

4. The Official Helicopter Blue Book, 1983, Helicopter Financial Services, Inc.

5. General Aviation Pilot and Aircraft Activity Survey, Report No. FAA-MS-83-1, Federal Aviation Administration, December 1983.

* Used by the majority, or all, of the system plans.

TABLE 5.1 RESOURCE MATERIAL USED IN EXISTING SYSTEM PLANS (CONTINUED)

7. Helicopter Facts, produced by the Appalachian Helicopter Pilots Assoc. and the Ohio Helicopter Pilots Assoc., 1982.

9. FAA, General Aviation Activity and Avionics Survey, Annual Summary Report, 1981 Data, 1984, FAA-MS-84-5.

10. Current Rotorcraft Fleet and Airman Characteristics, Phase I Report, COMSIS Corporation, Wheaton, Maryland.

11. Helicopter Forecasting Study, Final Report for Task 3: Regional Helicopter Forecasts, Dec. 21, 1984, Applied System Institute.

12. Hospital Aviation, various issues.

SOCIO-ECONOMIC

1. Directory of Federal Statistics for Local Areas, U.S. Department of Commerce, Bureau of the Census, U.S. Government Printing Office.

2. County and City Data Book, (latest edition), U.S. Department of Commerce, Bureau of the Census, U.S. Government Printing Office.

* Used by the majority, or all, of the system plans.

5.3 EVALUATION OF EXISTING RESOURCE MATERIAL

5.3.1 Federal Guidelines/Regulations

The first category of resources contains material developed and published by the Federal Government. It includes Federal Aviation Regulations (FAR), advisory circulars, FAA Orders, and related documents. The regulations, divided into parts, are the means by which the FAA controls civil aviation. These regulations cover such broad categories as airworthiness standards for aircraft, aircraft operations, and use of airspace. The advisory circulars (AC's) are published as guidelines, but are often adopted as minimum standards for different facets of aviation. The AC's cover such items as heliport design, noise assessment guidelines, model zoning ordinances, etc. FAA Orders include such areas of heliport development as environmental assessments, and the United States Standard for Terminal Instrument Procedures (TERPS).

Also included in this category are the National Fire Protection Agency's (NFPA) standards for fire protection at heliports. These must be used with caution, because depending on the size, the location, the amount of activity at a heliport and type of use, these regulations may be too stringent and may prohibit development altogether.

It is the responsibility of the planners to make sure that they have obtained the latest version of the Federal regulations and guidelines, and the responsibility of the FAA to insure that its material includes the most current information based on the most up-to-date research.

5.3.2 Helicopter Operational Characteristics

This category presents data on the characteristics of helicopter operation. The Basic Helicopter Handbook is a flight training manual on the basic operation of helicopters. It provides excellent information for those who wish to understand how helicopters fly and their basic capabilities. Other books describe the history of the helicopter and the basics of helicopter aerodynamics. These books provide understanding of helicopter use and development and are therefore important in understanding the demand for helicopter transportation in urban areas today. The Fly Neighborly Guide is useful in helping planners to understand the ways the helicopter industry is helping to mitigate noise complaints and the methods available to the urban planners. This includes appropriate location of approach/departure paths and formats for letters of agreement between helicopter operators and air traffic control facilities to guarantee compliance with noise mitigation measures.

5.3.3 Directories

The Aerospace Industries Association (AIA) directories list the helicopter operators in the United States, Canada, Mexico and Puerto Rico. There is also a directory for heliports in the United States, which includes helicopter specifications and services that provide direct and indirect support for the helicopter industry. The directories vary in their accuracy, currency, and reliability. In such a dynamic industry, it is difficult to keep up to date records on the locations of heliports and helicopter operators. These directories are useful in a general sense. They give the planner a basis from which to start determining an overall estimate of the numbers of helicopters, the number and location of heliports, and the determination of primary use in specific geographic areas. However, it is important to stress that more rigorous follow up documentation is required to verify initial findings.

In other directories, helicopter specifications are provided by the manufacturers and, on the whole, are accurate for planning purposes. It is suggested that, for precise reports, the manufacturer be contacted directly.

The listings of helicopter support services and organizations are generally very good and updated annually. Again, the helicopter industry reflects constant change and data should be cross checked. The latest versions are easily obtained from the publishing agency.

5.3.4 Transportation Theory

This section covers a range of topics from airport administration to benefits of the helicopter to communities. Especially useful are the National Aeronautics and Space Administration (NASA) publications

regarding the benefits of helicopter transportation, Community Rotorcraft Transportation Benefits and Opportunities, NASA CR166266, 1981, and Planning for Rotorcraft and Commuter Aviation, NASA/Ames Research Center Draft Report, July 1981. These publications relate helicopter use to urban development and transportation networks, and suggest ways of measuring the direct benefits.

Publications about airport administration, although exclusively about airports, present material that is useful in developing discussions on heliport management and administration.

Other documents, such as the PACER reports, generally contain technically correct data based on the laws of physics but do not reflect, in particular, how helicopters are flown, and therefore may have limited applications.

Other publications present plans devised to facilitate helicopter operation through one of the busiest aviation traffic areas in the world the Northeast Corridor. They are useful in showing that there are ways of managing helicopter traffic. They also demonstrate that the helicopter can be flown more precisely (2nm route widths enroute) and integrated safely with low altitude fixed wing traffic.

5.3.5 Forecasts

The Federal publications on aviation statistics are the only available source of data regarding the historic number of helicopters operating in the U.S. Although most of the data relate to airplanes and airports, records on the numbers of registered helicopters, broken out by type (piston and turbine) and geographic location are presented. The main drawback to this source is that the information for the current year is not usually available. However, if the FAA has compiled the information but not yet published it, it is available by telephone from the document's publishing office in Washington D.C.

Other publications on more specific topics, like the salary ranges of chief pilots and expected increases in corporate executive operations, are also available. Most often these articles are found in trade magazines; "Hospital Aviation", Howard Collett, Editor, is an excellent example.

5.3.6 Socio-Economic Data

Socio-economic data, like state and local aviation data, are most often available from the agencies in the geographic jurisdiction of the sponsoring agency. However, information on national trends is available. Articles regarding specific areas that have carry-over value to all areas, such as zoning acts to protect heliports, or how to conduct public meetings, are available.

Socio-economic statistics for specific areas can be obtained from the Directory of Federal Statistics for Local Areas from the U.S. Department of Commerce, Bureau of the Census, U.S. Government Printing Office. Also

the County and City Data Book, (latest edition) from the same source is published after each decennial and quinquennial economic census. Planning region data can be obtained from state, local and regional governments, and city and county planning departments. Chambers of Commerce and local newspapers are also an excellent source of brochures and general data on local economic trends.

A very important source of socio-economic data (as well as aviation data) is the Technical Advisory Committee members. Most aviation studies, especially those sponsored by governmental agencies have a Technical Advisory Committee. Members are chosen from the business community and planning agencies and from those persons with an interest in local aviation policies. This group monitors the progress and results of the plan. Since this group is more diverse in interests than a strictly aviation oriented group, it can be a valuable source of local social and economic information.

5.3.7 State and Local Aviation Data

This section discusses the type of material that is valuable for the system plan analyses and where it can be obtained.

The publications on national aviation statistics are broken down by state, region and county, but as the planning region becomes smaller, additional sources of information are necessary. Surveys are an excellent source of local information for aviation activity and are discussed in the next section. It is also a good idea to gather information directly from conversations with state aeronautics officials, and conversations with officials at the local airports and heliports. Airport managers, ATC tower chiefs, regional and local FAA offices, and FBO managers are good sources.

Also, local aviation organizations, such as helicopter pilots' association, are very informative. Talking to the president of the group or even better attending a meeting, and if possible making a presentation to the group about what the plan is attempting to accomplish is an effective way to get responses from the whole group and not just the officers. These groups can give insights into regional patterns, possible problem areas, and community attitudes.

For military activity, the state National Guard is an excellent source of information. Some information about military aircraft activity is restricted, however, the National Guard can either find out appropriate sources or indicate that the information is not available. The Coast Guard is another good source of information. If more detailed information is restricted, these agencies may be able to provide general patterns.

5.4 SURVEYS

Surveys are particularly important in the inventory phase of data collection. They are often the only source of data on local helicopter and heliport activity. Survey data can be gathered either in written form or by telephone.

It is beyond the scope of this report to discuss surveying techniques, however, a complete disucssion can be found in the third report of this series, "Heliport System Planning Guidelines" (DOT/FAA/PM-87/33), (DOT/FAA/PP-88/3). A general discussion of the strengths and weaknesses of the system plan survey is given in Section 3.0 of this report. This section will limit the discussion to the uses to which the surveys were put and their value in the system planning process.

Although the information sought through the surveys is primarily inventory data, it must be understood that these are the data upon which all subsequent conclusions and analysis of demand are based. Survey data include but are not limited to, location of based/active fleet, numbers and type of helicopters, number of operations, primary use, trip time, trip length, expected increase/decrease in business, etc. Because these data are vital to all consequent phases, particularly analysis of demand, it is important that the data gathered be as complete and accurate as possible. At the same time, it must be remembered that respondents are intimidated by extremely long survey forms and may not return them if they are overwhelmed by length. A balance must be struck between detailed information and statistical reliability.

5.4.1 State Heliport System Plan Surveys

All the state heliport system plans used surveys to gather information of local helicopter activity and, within small variations, all of the surveys attempted to collect the same base data. Two of the plans used a written survey for the helicopter owners and operators, with telephone surveys for heliport activity. The other two state system plans used helicopter owner/operator surveys, heliport surveys, and a survey of local governments designed to inventory local laws, restrictions and attitudes. Use of a survey to collect data on local governmental laws and attitudes is an extremely good idea. Since a state may have hundreds of towns, a discretionary limit, such as a population threshold, should be imposed.

6.0 CONCLUSIONS

6.1 PURPOSE

The purpose of this section is to draw conclusions from the information gathered in the previous sections regarding the evaluation of the strengths and weaknesses of the existing heliport system plans. This includes suggested methods of improvement and new areas of analysis.

6.2 FORMAT

This section is divided into two parts. The first part summarizes the evaluation of the heliport system plans presenting conclusions and recommendations regarding improvement to the existing structure in terms of format and data base element selection. The second part presents suggestions for areas of investigation or discussion that need to be included or expanded to improve the usefulness of these documents.

6.3 EVALUATION AND RECOMMENDATIONS

6.3.1 Standardization

In order to improve the efficiency and usefulness of the heliport system plan, certain investigative and analytical elements of the plans need to be standardized, and organizational guidelines need to be developed. The two most critical categories of planning elements needing standardization are data collection and forecasting. All the rest of the system plan develops from these two phases. Therefore, if these two elements are inaccurate, the subsequent analysis is faulty. The other elements, although not as critical, need topic standardization as well as organizational standardization. Overall, the development of the analysis and the conclusions in the existing plans is well done. Each plan developed logical site selection criteria and processes, and each understood the heliport design guide and Federal regulations. However, suggested standardization is provided below. More specific documentation can be found in the third report of this series, "Heliport System Planning Guidelines", (DOT/FAA/PM-87/33), (DOT/FAA/PP-88/3).

6.3.2 Data Collection

Much of the information in the inventory, or data collection phase of the system plans, is vague and not clearly presented or documented. Each plan independently defined and prioritized the importance of data and they are therefore, not consistent. Even data labeled identically in different plans have been collected and organized with different interpretations. Plans include data collection and evaluation at varying levels. Some used general categories while others provided greater detail. Consequently, comparison between plans is impossible. Specific data collection elements relevant to the purpose of the plan need to be defined, particularly those elements critical for the determination of existing and potential demand for heliports.

A primary problem is the identification of which helicopters within the planning region are significant to the demand analysis. In following the format of airport system plans, the number of helicopters identified within the planning region are called "based" helicopters. But there is confusion to whether "based" means registered aircraft or those aircraft active within the region. One plan defines "based" as "stored", yet uses those numbers as their baseline helicopter data. The terms "based", "registered", and "active" need to be defined in relation to what they mean in the context of demand analysis. Also, what roles each of these categories of helicopter plays, and which roles are the most appropriate for determining demand must be defined. This will make data collection more efficient and analysis more reliable. Since it is difficult to determine the number of active helicopters in a region, reasonable levels of statistical validity should be established. For example, if 70% (or whatever percentage is determined valid) of the area's active fleet can be identified, then it is reasonable to make assumptions on demand levels, etc.

Classifications of helicopters and heliports are developed independently because no standard exists. Much time, and many pages, are spent on the justification for these classifications. All independently developed classifications are slightly different, prohibiting direct comparison between system plans.

Different methods are used to define what geographical area is significant to the plan. Often data are collected from a region with no specified geographical boundaries and no reasons are given as to why the area is important. For planning purposes, both for data collection and for site selection, the area that is significant regarding helicopter activity in the plan's jurisdiction needs to be defined and explained. Guidelines need to be developed for identifying the market or service area for the planning region. This does not mean all plans need to look at a tightly defined area, like 100 miles around the planning region, but the guidelines must identify all factors that must be explored to determine what area legitimately affects the specific region's heliport demand.

In determining regional helicopter activity, again, the relevant data elements must be determined and the level of detail required for accurate demand analysis needs to be defined. The total number of helicopters alone is not adequate for determining the profile of helicopter activity. Suggested detail includes, but may not be limited to, the numbers of operations and the number of hours flown, the percent of night operations, the percent of actual and potential IFR operations, the types of missions, the origins and destinations, etc. The same type of data is also necessary for evaluating existing heliports, as well as their location, use, and operational characteristics of future heliports.

Criteria for relevant and purposeful data collection need to be established, and standardized categories of helicopters and heliports need to be developed. When standardization and organizational guidelines are developed, the heliport system plan will be a more accurate planning tool, both for the sponsor of the plan at the local or regional level,

and for national planning purposes. Then, meaningful comparisons can be made regarding the priorities of funding and support. Additionally, this effort can be the beginning of a reliable data base for future planning efforts.

6.3.3 Forecasting

Forecasting is perhaps the most difficult task of the heliport system plan. Traditional methods of forecasting aviation activity do not fit the data available. There are few, if any, historical records of helicopter activity as there are for fixed-wing activity. Traditional relationships between socio-economic data and helicopter activity are not the same as they are for fixed-wing activity. Additionally, accurate levels of current helicopter activity are difficult to determine. Consequently, each system plan develops its own independent, although similar, methodologies for forecasting activity and demand. Most of these methodologies are based on fixed-wing methods that are "forced to fit" the helicopter situation. Standardized relevant forecasting methodologies are needed.

Forecasting gross numbers of helicopters is not an adequate determination of future helicopter activity. Forecasts should be made of the number of helicopters by type, primary use, operations, hours flown, etc. These and additional critical elements must be defined. Development of required data elements that are critical to accurate forecasting is needed.

Since accurate data are difficult to collect, standards should be set on how to collect the data, i.e., what the best sources are, and how much data can be considered adequate, and what percentages of activity can be considered statistically valid for forecasting. The need for standardization is also apparent regarding forecasting heliport activity.

In developing standard elements and methodologies, perhaps new statistical approaches could be devised that are specifically tailored to heliport planning purposes and to the data available. One plan used a percentage of automobile commuters identified as potential helicopter passengers to define expected demand. This is an example of a new approach. This and other new approaches should be developed and integrated with the old methods to enhance validity, accuracy, and applicability of forecasting methods.

6.3.4 Organization

Although most of the plans follow the same general organization, a format patterned after the airport system and master plans, various contortions are developed in trying to accommodate the differences in heliport planning. Heliport systems plans run the gamut from extremely organized and logical, to very confusing. The early planning efforts tend to "throw in" anything and everything they could find on helicopters and heliports. Some items are holdovers from airport system plans, while other items are an attempt to define a new discipline. As the specific needs of heliport system plans became apparent, the plans become more organized. Areas that are particularity well done are the identification

of heliport siting criteria and site selection processes. But the logical sequence and organization of heliport system plans, from the data collection phase through the implementation phase, need to be standardized. Elements that are significant to the overall analysis of demand need to be distinguished from items that are interesting but not particularly useful.

Most of the system plans and planners showed an understanding of helicopter aviation, its elements and operational characteristics. There are only a few places where this understanding lapsed. One example is the confusion regarding why the uses of a region's helicopters and heliports are different. This confusion indicates that there is minimal comprehension of what types of helicopter activity created demand for heliports, an essential element in the analysis of demand. Other examples are the lack of understanding of competing transportation modes and use of helicopter industry statistics that are out of date. This point is essential in demand analysis and location theory. As a result, the system plans do not include adequate discussion of helicopter system integration with ground transportation, which is, of course, the basic element of urban transportation. In the other extreme, some plans do not consider how airports fit into the system evaluation. Such lack of understanding on the part of aviation planners does not promote the public understanding of the development of heliports. Standard guidelines for major categories of required planning elements with brief explanations of their significance could eliminate any misunderstanding on the part of the aviation planners.

Another area that needs attention is the quality of the tables and figures. Some plans do an excellent job, particularly on graphics, but others do not. Tables are often labeled so poorly that it is impossible to know whether the data presented are on the planning region or on national statistics, or sometimes what the table is representing. Some figures are very well presented. Others are sloppy, unclear and/or unreadable. Sources need to be indicated on every table and figure.

6.4 NEW DIRECTIONS

As has been stated in the previous sections of this report, heliport system plans are unique in aviation planning. Their significance and importance are just being recognized. Previous efforts have been based on airport planning documents. As techniques have developed, the differences between airport planning and heliport planning have become apparent. In order to refine heliport system planning into a separate discipline, these differences must be developed through understanding the special requirements of the helicopter system plan. This way they will become more valuable as planning tools because their accuracy and effectiveness will be improved. New areas of development fall into three categories. These are: new perspectives for aviation and non-aviation planners, public perceptions, and benefits to the community. These new elements are discussed in the following sections:

6.4.1 New Perspectives for the Non-Aviation and Aviation Planner

Many of the planning concepts identified in Section 2.0 of this report are necessary, not only for a complete and accurate heliport system plan, but also to help the non-aviation planner and the public to understand what helicopters and heliports are all about. They provide the background of helicopter capabilities and competing modes of transportation so that there is an understanding of why helicopter use is necessary and increasing in urban areas.

Conversely, the aviation planner needs to become familiar with urban development and traditional transportation theory, much more than is necessary with airport planning. Airports, although developed near towns and cities, are often located apart from actual urban environment. Changes in urban patterns, how and why cities grow, and population movements should be understood in order to effectively incorporate viable heliports into the urban infrastructure.

Planning elements incorporated into heliport system plans should include both aviation and non-aviation perspectives. This will facilitate an understanding on both sides of the issue, and can work together on the improvement of the urban transportation system.

6.4.2 Public Perception

Because helicopters and heliports are operating within the urban environment, the public is much more aware of helicopters than they are of other forms of aviation that operate primarily outside of their experiences. In fact, since urban development has often overtaken airports that once were located in relatively isolated areas, the public has been impacted by, and at times felt threatened by, aviation more now than at any other time in the history of flying. In places where airports have become a disturbance to the community, the public is even more sensitive to helicopters. Various reasons regarding the public's sensitivity to helicopters have been postulated. Most often there are two reasons the public does not like helicopters, the noise, and the fear that helicopters will "fall out of the sky" on top of them. The public also thinks of helicopters as "toys for the rich" and sees no practical use for the noisy intrusion into their communities. However, when they understand the reasons for certain helicopter uses, such as police protection operations, then complaints decrease or stop. Therefore, the reasons and benefits for all helicopter uses need to be explained.

A corollary to this element is the identification of political attitudes at all levels, such as how do the local officials feel about helicopters and heliports. It is important to understand the climate within which the system plan is being undertaken.

6.4.3 Safety and Noise

It is the job of the heliport system plans and planners to help alleviate these fears and complaints. This can be accomplished through a better understanding of the public perceptions and by discussing the factual aspects of helicopter operations, the possible mitigation methods for the public's fears and complaints, within the context of the plan.

This is best accomplished in the environmental sections of the plans. Factual representation of noise levels and mitigating measures should be adequately discussed. Incorporating approach/departure paths into system plan recommendations that provide for egress and ingress routes that impact the population in the least possible way is necessary. Safety measures should also be discussed, including safety statistics, operational theory, how helicopters fly, and autorotation capabilities.

Standardized elements for discussion of these topics allow heliport system plans to present these very important concepts within the plan and further promote public awareness and understanding of heliport development.

6.4.4 Benefits to the Community

Another very important element that has been minimally acknowledged in the system plans are the direct and indirect benefits to the community of helicopter transportation and operation. As explained in the last section, the public feels less hostile to helicopter operations if they feel there is a good reason for them. Public service operations such as police, fire and rescue, and aero-medical transfers, are easily understood. However, an effort must be made to develop qualitative and quantitative methods for measuring the less obvious contributions to the community of helicopter operations in terms of financial and business benefits. All new transportation modes have been considered "toys of the rich" until mass production made them accessible to the public.

This approach, perhaps, more than anything else, will promote the acceptance by the public of helicopters and heliports in urban areas. The more familiar the helicopter becomes and the less threatened the public feels, the more acceptable helicopters, and consequently heliports, will become.

6.5 SUMMARY

As helicopter usage has become more common in urban areas, concern for the efficient integration of helicopter operation into the urban transportation infrastructure has come from both the public and the helicopter operator. Heliport system plans have become an increasingly critical tool at all levels of governmental planning. Although these original plans were excellent and provided substantial data to support and encourage heliport development, the structure of the early heliport system plans is based on the only similar aviation plans available - the airport system plans and master plans. As the heliport plans evolves, many differences between heliport planning and airport planning become apparent. The major differences are the availability of data and resources, the applicability of forecasting methodologies, the relationships between socio-economic patterns and helicopter use, and the more specific, and often emotional, public concerns. Therefore, the heliport system plan needs its own structure that would refine heliport planning into a discipline in its own right. Standardized planning elements and a more structured organization, geared specifically to the needs of heliport planning, would mean that heliport system planning would no longer be just an adaptation of the airport system plan.

Under the circumstances, the existing heliport system plans have been very well done. The planners have been able to comprehend the unique requirements and produce viable results. They recognized and worked through the limitations and developed workable site selection criteria and processes. As more plans were developed, the structure and organization of the plans improved. Because these plans were based on the format of planning documents developed for fixed-wing aviation, the heliport systems plans were similar in their product. However, unlike fixed-wing system plans, there are limited structures for data collection and analyses. For instance, there are no standardized terms and categories for heliport and helicopter classification. Therefore, the planners have independently tried to develop classifications on which to base data collection, forecasts and analyses. As such, the plans are somewhat dissimilar. This creates problems in organization and in direct comparability.

One of the goals of heliport planning should be to create an understanding between the aviation and non-aviation worlds. To the average person, anything regarding flying is considered more or less "magical". The general public's only contact with aviation is with commercial transportation. People get into a very big airplane at one location and are let out at another. The helicopter brings aviation literally right into the neighborhoods. This mystical element, as well as the practical application of helicopters, must be broached through an understanding of the function and capabilities of aviation in general, and helicopters in particular. This is especially true for planners at every level of government. Very few planners considered aviation knowledge important to urban planning. Specific elements in the heliport plans must be aimed at educating those persons who make decisions on heliport implementation regarding the characteristics and benefits of urban helicopter operation. Conversely, those persons promoting helicopter operation in urban areas, especially aviation planners, must become familiar with urban planning theory and trends, so that heliport siting is as accurate and viable as possible.

Heliport system plans should not become "form letters". They need to be adapted to the purpose and need of the sponsoring agency and geographic setting for which they are developed. However, to be effective for the sponsoring agency and for national aviation planning, certain elements need to be standardized, at least to the level seen in airport planning, so that the plans of different geographic regions can be compared as equals.

This comparability serves two purposes. First, it provides for accurate demand analyses because all the necessary aspects for effective planning will have been included. Second, it allows for more efficient national allocation of funds and support because priorities can be established in real terms. An additional indirect benefit would be the beginning of a more accurate data base for future planning efforts on a national level.

END